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NetworkAIR™ FM-DX

Computer Room Air-Conditioning—60 Hz

Technical Data

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FM	Capacity (kW)	Module	Configuration	Voltage	Reheat	Humidifier	Air Pattern
FM	35	G=DX R22	A= Air Cooled	BA= 208-230/3/60	E= Electric	S= Replaceable Steam Canister	D= Downflow
	50		E= Air Cooled with Multicool	KA= 480/3/60			U= Upflow (front return)
			W= Water Cooled	MA= 600/3/60			
			F= Water Cooled with Multicool				
			D=Water Cooled with Economizer				
			G=Glycol Cooled				
			B= Glycol Cooled with Multicool				
			P= Glycol Cooled with Economizer				
FM	**XX**	**X**	**- X**	**XX**	**- X**	**X**	**X**

Overview

The modular, Floor Mount computer room air-conditioning system offers efficient, effective and economical cooling for a variety of spaces.

Computer room environmental requirements now reach far beyond the confines of the traditional data center or computer room to encompass a larger suite of applications, referred to as technology rooms. Critical environment applications include:

- Computer rooms
- Telecommunication facilities
- Clean rooms
- Power equipment
- Medical equipment rooms
- Archives
- LAN/WAN environments

A worldwide network of APC representatives is fully qualified to provide engineering, sales, installation and service for our products.

APC warrants all parts for 12 months from shipment. Extended warranties are available.

Model
The NetworkAIR FM is available in two models: FM35 and FM50.

Room Air Distribution
Downflow systems discharge air into the raised floor plenum. These systems are suitable for areas with raised floors greater than 12" (305 mm) high. Return air is drawn in through the top of the system.

Downflow systems also include a static regain plenum for each blower. This evens out velocity profile and increases static performance while reducing the noise level. It also allows access to some components while the system is operating, without interrupting airflow.

Upflow systems discharge air into either a plenum or ductwork. These systems can be used when a raised floor does not exist or is not suitable for cooling. Air is drawn in through the front and optionally from the rear of the system.

The NetworkAIR FM delivers high volumes of airflow (550 cfm per ton (160 cfm/kW) to eliminate hot spots in densely populated environments.

Configuration
- Glycol Cooled
- Glycol Cooled with Economizer
- Glycol Cooled with MultiCool (Chilled Water Coil)
- Water Cooled
- Water Cooled with Economizer
- Water Cooled with MultiCool (Chilled Water Coil)
- Air Cooled
- Air Cooled with MultiCool (Chilled Water Coil)

Compliance Approval
- UL Listed to UL 1995 and CSA C22.2 No. 236
- MEA (City of New York)

c UL us LISTED

Standard Features
- Tandem Scroll Compressors
- Configurable Dehumidification
- Direct Drive Motor/Blower
- Frequency Controlled Motor
- Electrical Panel
- Double Skin Panels
- Microprocessor Controller
- Programmable Input/Output Interface Module
- Main Power Circuit Breaker(s)
- 94VO Thermal (anti-fungal) Condensate Pan
- Refrigerant Charge Isolation
- Predictive Failure Warnings
- Evaporator Freeze Protection
- High Return Air Temp Capability
- Network Management Card
- Redundant Group Control
- Refrigeration System Monitoring
- Replaceable Steam Humidifier
- SCR Controlled Electric Reheat
- 30% ASHRAE 52.1 Filters
- High Lift, Dual Float Condensate Pump

Optional Features
- Water Regulating Valves
- Brazed Plate Condenser (Water/Glycol)
- Plenums (with or without grilles)
- Floorstand
- Discharge Duct Collar
- Sub-Base
- Firestat
- Smoke Detector
- Water Flowswitch (Water, Glycol, Economizer, or MultiCool)
- Spot/Cable Water Detector(s)

Scalable Solution for Critical Environments

Temperature and Humidity Design Conditions
Maintenance of temperature and humidity design conditions is critical to the smooth operation of a technology room. Design conditions should be 72-75°F (22.2-24.8°C) and 45-50% relative humidity (R.H.). As damaging as the wrong maintained conditions can be, rapid temperature swings can also have a negative effect on hardware operation. This is one of the reasons hardware is left powered up, even when not processing data. Computer room air conditioning is designed to maintain temperature at ±1°F and humidity at ±3-5% R.H. 24 hours a day, 8760 hours a year. Vapor barriers and sealed rooms are required to maintain these tolerances.

In contrast, comfort systems are designed to maintain ±5°F from the temperature setpoint. There is usually no dedicated humidity control and the simple controllers cannot maintain the set point tolerance required for temperature, allowing potentially harmful temperature and humidity swings to occur. This is not acceptable for sensitive electronic equipment.

Air Quality
Computer room air conditioners provide a high CFM, around 550 CFM/ton (155 cfm/kW). This high CFM moves more air through the space improving air distribution and reducing the chance of localized hot spots. It also allows more air to move through filters, ensuring a cleaner environment. This requires a moderate- to high-efficiency filter bank to minimize airborne particles.

Problems Caused by the Wrong Environment
A poorly maintained technology room environment will have a negative impact on computer room operations. The results can range from data corruption to complete system shutdowns and failures.

High & Low Temperature
A high or low temperature swing or rapid temperature swings can corrupt data processing and shut down an entire system. Temperature variations can alter the electrical and physical characteristics of electronic chips and other board components, causing faulty operation or failure. These problems may be transient or may last for days. Transient problems can be very difficult to diagnose and repair.

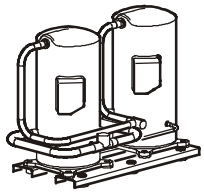
High Humidity
High humidity can result in tape and surface deterioration, head crashes, condensation, corrosion, paper handling problems and (gold and silver) migration leading to component and board failure.

Low Humidity
Low humidity greatly increases the possibility of static electric discharges. Such static discharges can corrupt data and damage hardware.

APC NetworkAIR™ FM-The Right Solution
The APC NetworkAIR™ FM provides the maximum amount of computer room cooling in a compact footprint. Highly scalable, the system is capable of growing with your cooling needs as they increase. Each system comes standard with concise capacity controls for high efficiency operation.

Compact Footprint
The NetworkAIR FM delivers a high capacity of cooling in a small “overall” footprint. Since the system requires only front service access, units can be placed side by side and valuable floor space is not wasted.

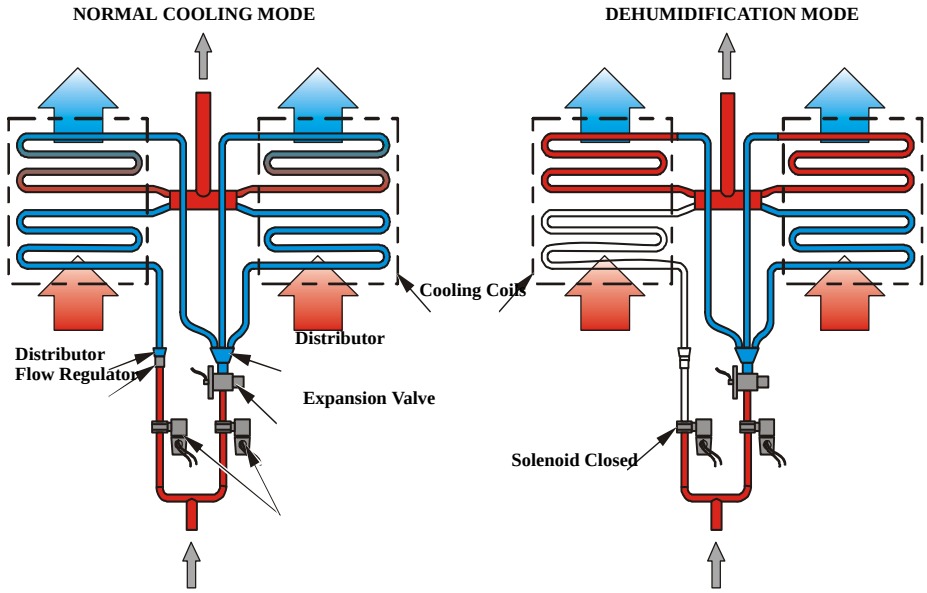
Capacity Control
The NetworkAIR FM utilizes tandem scroll compressors for two step modulation. One or both of the compressors can run depending on the load of the system. This allows up to two steps of “true” unloading without the power factor and friction penalty of an unloaded semi-hermetic compressor.



Efficiency and Reliability
The high EER (up to 20.0) and few moving parts of scroll compressors provide efficient and reliable operation. Scroll technology has unparalleled ability to withstand liquid refrigerant ‘slugging’ which is a major cause of compressor failure. It is designed as a single assembly with one suction line and one discharge line per set.

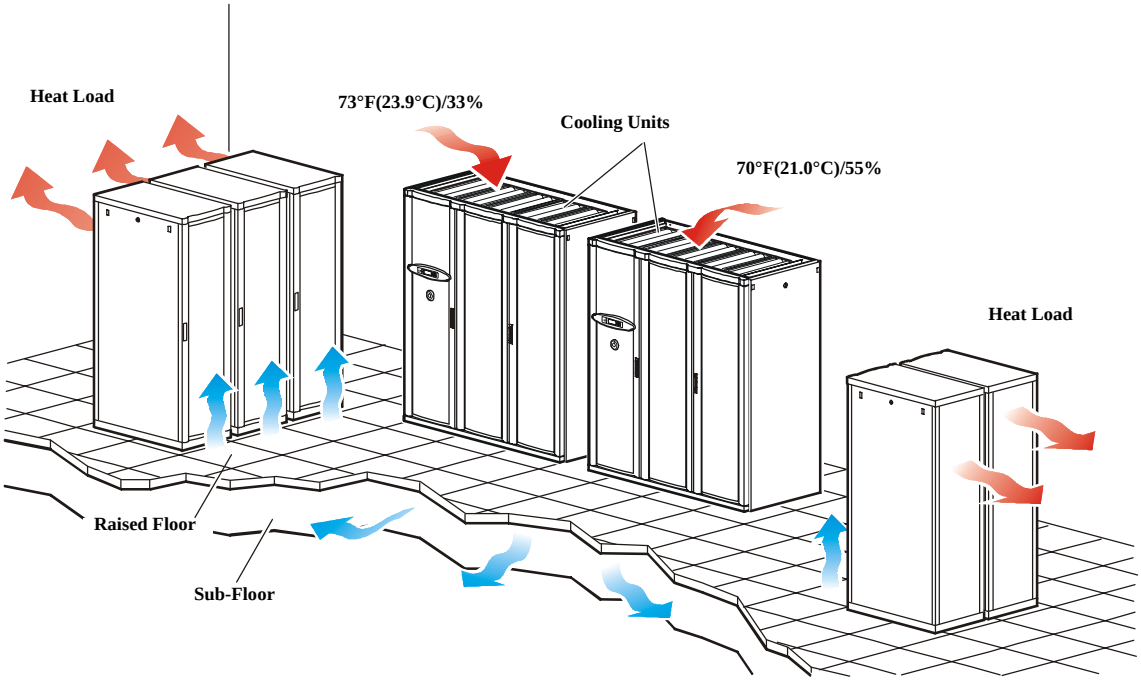
Dedicated Dehumidification Cycle

A dedicated dehumidification cycle allows the system to increase latent capacity without overcooling, lowering the requirement for reheat and humidification. This is accomplished by operating one compressor, isolating a portion of the coil from the refrigerant flow and lowering the evaporator temperature when dehumidification is required. Two compressor operation during dehumidification mode may be enabled through the microprocessor for humid environments where more latent capacity is required.



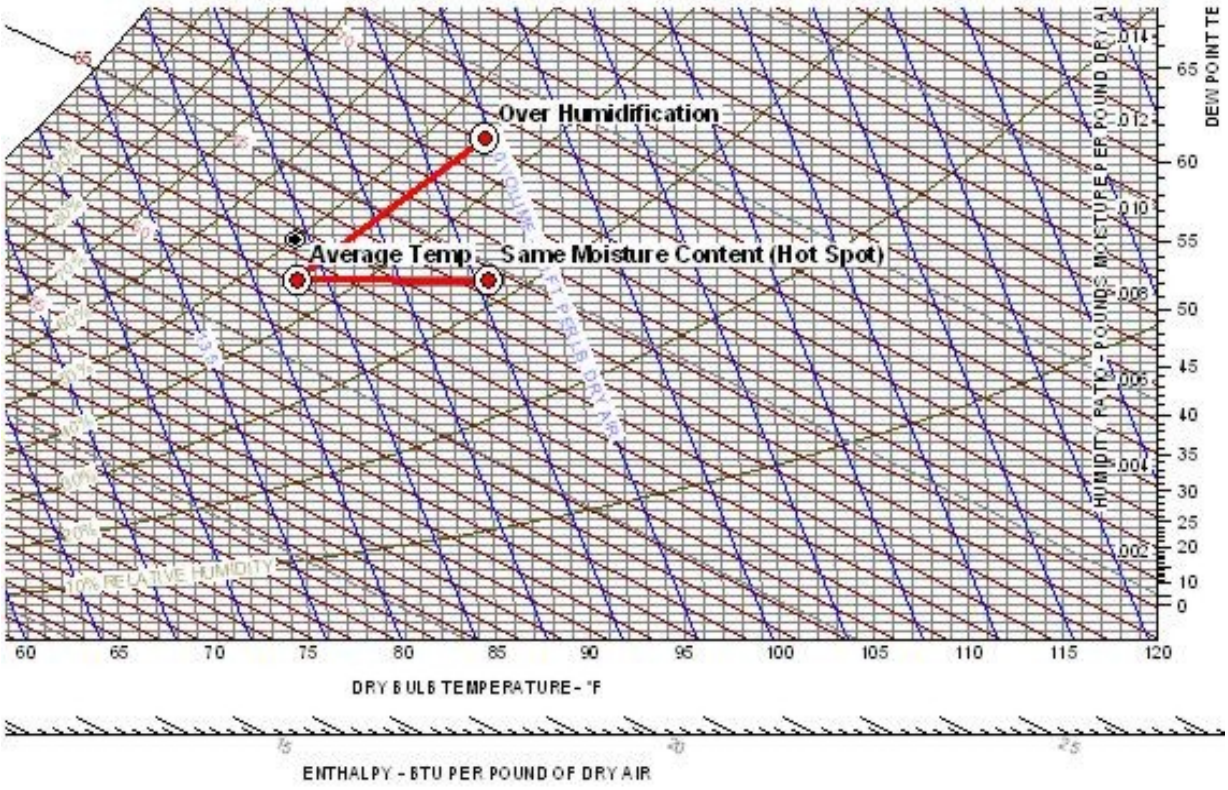
Demand Fighting

In rooms with multiple units, return temperature and humidity may vary a small percentage. This variance may result in units operating in conflicting modes. For example, one unit may be dehumidifying while another, within close proximity, is humidifying. This results in demand fighting and lower overall efficiency.



Humidity Control

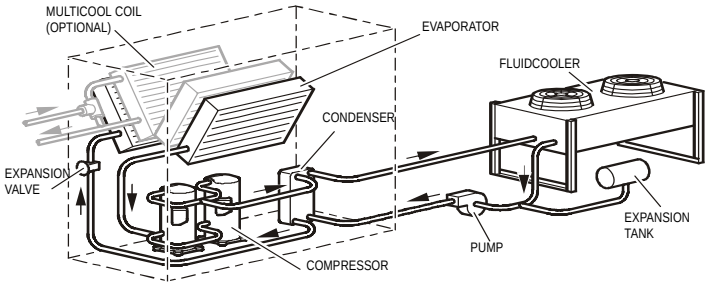
Increasing heat densities in data centers are leading to more hot spots and higher return temperatures to the precision air conditioners. When hot spots exist in close proximity to the air conditioner, temperature and humidity readings can be misleading to the overall room conditions. As temperature increases, the relative humidity (R.H.) level (the amount of moisture the air can hold at a given temperature, shown as a percentage) decreases. If the air conditioner is set to control on R.H., it will over humidify based on the higher return air temperature and lower R.H.. There are two methods of preventing this over-humidification. The most accurate way to achieve this is by changing the humidity set point on the controller to dew point control. You can see from the horizontal line in the psychrometric chart that the dew point does not change as the dry bulb temperature increases from 75°F (23.8°C) to 85°F (29.4°C). However, humidifying the room to maintain 45% R.H. would result in excess moisture content in the room. Another way to prevent over-humidification from hot spot fluctuations is through temperature and humidity averaging. This ensures that an outlying condition does not affect the overall room conditions. Individual hot spots should be addressed using heat removal architectures to address the problem at the rack level. See APC White Paper #55 for more information on air distribution architechtures.

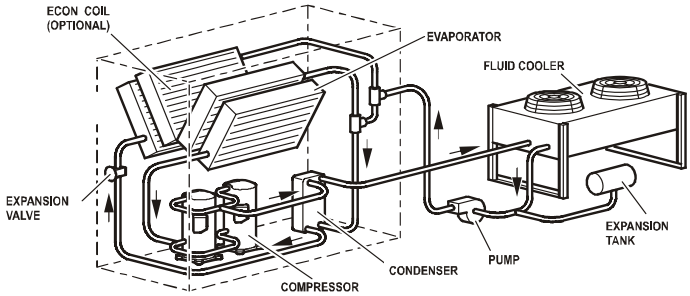

Over Humidification
Average Temp.
Same Moisture Content (Hot Spot)
DRY BULB TEMPERATURE - °F
ENTHALPY - BTU PER POUND OF DRY AIR
HUMIDITY RATIO - POUNDS MOISTURE PER POUND DRY AI
DEW POINT TE

Glycol-Cooled Configuration

Glycol-cooled systems are completely charged and factory tested in a sealed system for reliability. In mid to low ambient climates, an economizer coil can be used to increase efficiency and extend compressor life. Economizer operation greatly reduces the energy consumption of the system. Water regulating valves control head pressure.

- System is used with a fluid cooler.
- Factory tested as a sealed system.
- Eliminates the need for field refrigerant piping.
- No requirement for water treatment.
- Economizer option for high efficiency.
- Low maintenance.

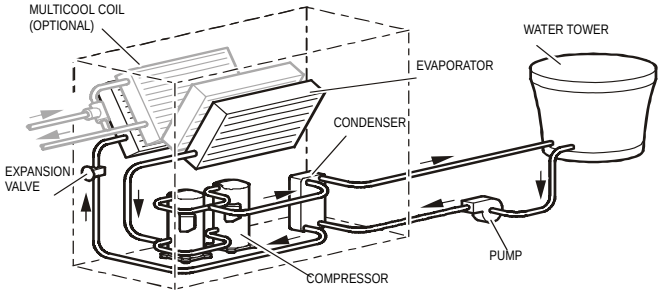


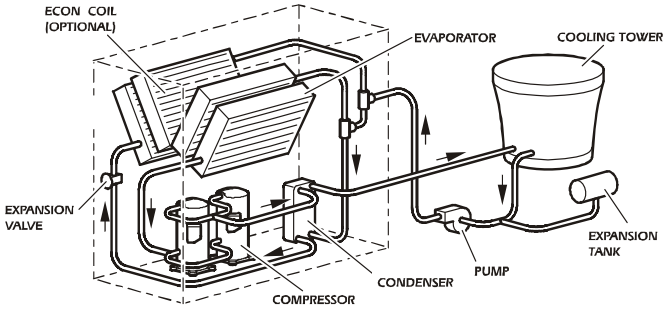


Water-Cooled Configuration

Water-cooled systems are completely charged and factory tested as a sealed system for reliability. Cooling towers are used as a source of heat rejection and can be used to serve multiple indoor units. Towers utilizing outdoor air require water treatment.

- System used with a cooling tower or other source of water.
- Factory sealed and tested system.
- Eliminates the need for field refrigerant piping
- Economizer option for high efficiency

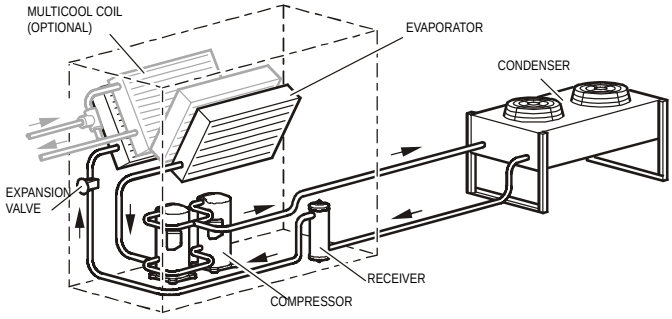




Air-Cooled Configuration

Air-cooled systems are not pre-charged from the factory, requiring field refrigerant piping. Each installation requires an engineered piping solution. APC strongly recommends installation by a highly qualified refrigeration contractor, to avoid improper elevation and long piping runs.

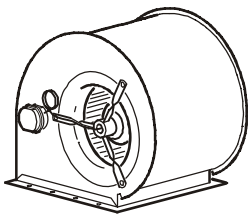
- System used with a remote air cooled condenser
- Requires field refrigerant piping
- Low maintenance



Standard Features

Double Skin Panels
The frame is bolt together 12 gauge formed steel for maximum strength. Cabinet is serviceable from the front. All exterior panels and corner posts on the frame are powder coated for durability and an attractive finish. Front exterior panel crowne is 16 gauge. All other panels are double skin, 24 gauge exterior, 24 gauge interior with 1 ½ lb. (.68 kg) per cubic foot insulated for quiet operation. Insulation is CFC-free and recyclable. Double skin panels isolate insulation from the air stream and further reduce sound levels. Left and right front panels are hinged and removable for easy access. Middle panel is removable.

Direct Drive Motor/Blower Assembly
Each cabinet includes a precision balanced centrifugal blower assembly(s) that is balanced to less than 1 mil displacement on all axis for quiet, reliable operation. The blowers are mounted based on mass and frequency to eliminate vibration and noise. A direct drive (L_{10}-500,000 hour bearing life) motor and frequency controller are used with each blower in the system to enhance user functionality. Each unit is equipped with two blower assemblies.



Frequency Controlled Motor
A frequency controlled drive is installed for each direct drive blower motor. The frequency controller communicates with the microprocessor controller allowing user adjustable rpm settings via the main display. This makes field air balancing quick and easy. Field air balancing is a common after thought that can be expensive and lead to back-charges. Each time the fans are started, the frequency controlled drives control the ramp-up of fan speed. This thirty second soft start lowers the in-rush current and reduces the locked rotor amps used when sizing generators.

Tandem Scroll Compressors
The refrigeration system operates under a master controller for greater efficiency and accuracy. Suction and discharge pressures are monitored and electronically controlled. Tandem scroll compressors are designed for year-round operation with a 15-year life expectancy. The microprocessor controller provides real-time suction and discharge pressure readings reported by transducers installed on the refrigeration system.

Electrical Panel
The electrical panel contains the contactors, starters, overload protection devices, and input power disconnects.

Evaporator Coil/94VO Thermal Condensate Pan
Evaporator coil is 1/2" rifled, copper tube, with raised aluminum fins. Condensate pan is 94V0 thermal formed, anti-fungal, non-ferrous material for higher indoor air quality. Evaporator is configured as a V coil.

Programmable Input/Output Interface Module
The main module provides field connections through a system programmable input/output module. Up to three additional input/output interfaces may be added to the main module. Each interface module is programmable with inputs that can be mapped to any system alarm or annunciated to outputs as a system alarm or custom (12 character) alarm.

Main Power Circuit Breaker(s)
A nonautomatic main power circuit breaker disconnects all high voltage power to the unit if necessary. The disconnect switch is accessible without removing the electric box cover.

Redundant Group Control
Allows up to 4 groups of 3 FM units to communicate with each other for redundancy, demand fighting prevention, mode assist, and global sharing of certain settings. Requires standard network cable interconnection.

Network Management Card
Permits multi-level access to monitoring, control, and event notification features over the user's network.

Evaporator Freeze Protection
Suction pressure is actively monitored and controlled to eliminate risk of condensate freeze-up on the evaporator.

Predictive Failure Warnings
Several components within the unit will provide a warning that service is needed prior to failure occurring.

Steam Generating Humidifier
The humidifier utilizes a pure steam generator specifically designed for precision environmental control. The pure steam eliminates contaminating mineral deposits, potentially harmful bacteria, white dust and excessive humidity. The humidifier requires little scheduled maintenance. Automatic flushing combined with a communication link to the controller signals when the canister is to be changed. Humidifier is proportionally controlled to meet the humidification demands of the conditioned space. The communication link to the main controller provides diagnostic capability for the humidifier.

High Return Air Temperature Capability
All NetworkAIR FM units are equipped to handle the high return air temperatures associated with today's high density applications.

Refrigerant Charge Isolation
For compressor protection, the NetworkAIR FM utilizes charge isolation and crank case heaters during compressor off-cycles. This eliminates the threat of liquid refrigerant migration that could lead to compressor slugging and lubrication issues.

Refrigeration System Monitoring
The system reports real time monitoring of both suction and discharge pressures to the controller. Pressures shall be logged and displayed at the proper menu selection on the controls.

High Lift, Dual Float Condensate Pump
The factory installed and wired condensate pump is capable of pumping 60 gal/hr (0.06 L/s) at 60 ft. (18.3 m) head.

30% ASHRAE 52.1 Filters
The filtration of conditioned air is extremely vital to maintaining the clean, particle-free environment required by electrical equipment. The system uses 30% efficient (100 microns) (ASHRAE 52.1-92), 4" (102 mm) deep filters, with full depth filter pleats. Deeper filters produce a lower pressure drop, requiring less energy during normal operation. Filters are replaceable through the front of the upflow unit, and through the top of the downflow unit.

SCR Controlled Electric Reheat
Electric reheat elements are low watt density, wired for 3-phase and loaded equally on all three phases, SCR controlled, and electrically and thermally protected by both automatic and manual reset thermal cut outs. Reheat coils are stainless steel, fin tubular construction.

Optional Features

Brazed Plate Condenser
Water- and Glycol-cooled systems employ a brazed plate heat exchanger. The condenser is equipped with clean out plugs. Rotalock valves make removal of the brazed plate condenser easy for maintenance and replacement.

Water Regulating Valves
Water and glycol cooled systems utilize two- or three-way valves to regulate the amount of water or glycol supplied to the condenser in response to refrigerant discharge pressure. The standard valve pressure rating is 400 psi (2758 kPa).

Cable Water Detector
A leak detection cable is placed on the floor or subfloor around all possible leak sources. If water or other conductive liquids contact the cable anywhere along its length, the master controller visually and audibly announces a leak. The 20 ft. cable may be cascaded to make custom lengths up to 500 ft. A maximum of four detectors (spot or cable) may be installed.

Spot Water Detector(s)
The solid-state spot water detector activates an audible alarm on the controller when moisture is detected. A maximum of four detectors (spot or cable) may be installed.

Firestat
A firestat is available for factory installation in the air stream of the unit. If the return air temperature reaches 125°F (52°C), an audible and visual alarm on the microprocessor will be activated and the unit will immediately shutdown.

Smoke Detector
The factory-installed smoke detector is designed to sense smoke in the return air stream. Upon detection of smoke, an audible and visual alarm on the microprocessor will be activated and the unit will be immediately shutdown.

MultiCool
The MultiCool systems contain a chilled water coil and direct expansion coil within the same cabinet. Either cooling coil can be used as a backup to the other. These systems provide cooling using either building chilled water and/or the direct expansion system.

Economizer
Glycol and water cooled systems may be optionally configured with an economizer coil. During cold ambient conditions, the compressorized system will shut-down and utilize the cold outdoor air to cool the water/glycol system, rerouting it from the brazed plate heat exchanger to the economizer coil for efficient operation. One step compressor operation may be utilized to assist in economizer mode.

Flowswitch
Single pole, double throw flowswitch detects when fluid flow drops below the set flow rate. Ships loose for field installation.

Network Cable
Various lengths of network cable are available to ship with your cooling system. Network cable is used to interconnect multiple cooling units in a redundant group, as well as to connect the network management card to your LAN.

Floorstand
The floorstand raises the unit above the subfloor to match the height of the raised floor. Floorstands are equipped with air deflectors for optimal air distribution. Heights are available (from 12” (305mm) to 24” (610mm)) on FM35 and (from 18” (457mm) to 24” (610mm)) on FM50 in 3” (76.2mm) increments and are adjustable +/- 1.5” (38.1mm). Adjustment is provided by threaded pedestals. Vibration absorbing pads are included. The floorstand, pedestal, and pads ship loose.

Discharge Duct Collar
A 1” (25.4 mm) duct flange is shipped loose from the factory for field installation to provide connection to external ductwork for either supply or return as needed.

Sub-Base
The Sub-Base raises the height of the unit by 10” (254mm) on upflow units to provide access for electrical and piping connections. Front and rear access panels on the sub-base are removable.

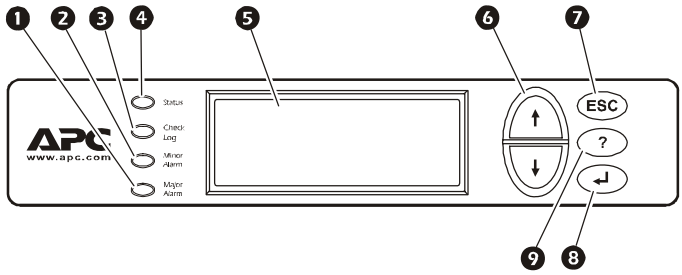
Plenums
Discharge plenums are available on upflow and downflow systems. On upflow configurations, heights are offered in 20” (508mm) and 24” (610mm) with front, 2-sided, or 3-sided grilles. On downflow configurations, the plenum raises the FM35 units by 12” (356 mm) and the FM50 by 18” (457mm) and discharges air horizontally from the front of the plenum. This application is recommended in rooms where racks are positioned in hot aisle/cold aisle configurations. Discharge air should be ducted down cold aisles.

Additional Programmable Input/ Output Interface Modules
Each system is equipped with up to 3 additional discrete input/output modules for a total of 16 input/outputs. Each interface module is programmable with outputs that can map from any system alarm through the microprocessor controller. Inputs are capable of mapping to outputs as a system alarm or custom alarm.

Environmental Monitoring Unit
A stand-alone unit performs contact monitoring and continuous temperature and humidity sensing through two probes (one included). The unit is controlled by available web, control console, or SNMP interface with a network connection. In the event of an environmental anomaly, notification is sent via e-mail or SNMP. The unit is 18.25” x 9” x 2.75” (464mm x 229mm x 70mm). The probes extend up to 12’ (3.66m) from the unit.

Environmental Management System
A browser-accessible, 1U, rack-mountable appliance allows monitoring of environmental conditions. Monitoring of one temperature, one humidity, and one vibration sensor ship standard. When conditions change, notifications are sent via email to appropriate personnel. The EMS provides 8 input contacts, 2 output relays, and controllable power outlets for defining actions remotely should conditions warrant it.

Microprocessor Controller



❶	Alarm LED
❷	Warning LED
❸	Check Log LED
❹	System On LED
❺	Liquid Crystal Display (LCD)
❻	Menu Selection scroll keys
❼	ESC key
❽	Enter key
❾	Help key

Microprocessor Controller
The microprocessor controller is standard on each system. The controller provides precision control for the demanding requirements of:

- Data centers
- Control rooms
- Clean rooms
- Switch rooms
- UPS rooms

The easy-to-use display allows the operator to select options from the device's menu-driven interface to control and monitor the connected air conditioning system.

Open Architecture
The NetworkAIR FM protocol is open for integration with all building management systems. Communication interface on the system can be MODBUS RTU RS485.

Control Type
Controller utilizes proportional and integral derivative (PID), a time proven precision environmental control method. This allows for custom tuning of control variables to achieve desired system response.

Functions

- Status Report
- System Control
- Event Logging
- Redundant Unit Group
- Static Pressure Adjustment

Logging
The microprocessor displays the 64 most recent alarms. Each alarm log contains a time/date stamp as well as operating conditions at the time of occurrence. The controller also displays run time, in hours, for major components (compressors, heaters, humidifier, blower motors).

Control
The backlit, four-line x twenty-character display is password configurable.

- Temperature Setpoint 60-90° F (15-32° C)
- Humidity Setpoint 30-80% R.H.
- Blower Motor Setpoint 20-60Hz. (Factory preset for model size and options.)
- High Temperature Alarm 35-90° F (2-32° C)
- Low Temperature Alarm 35-90° F (2-32° C)
- High Humidity Alarm 15-85% RH
- Low Humidity Alarm 15-85% RH

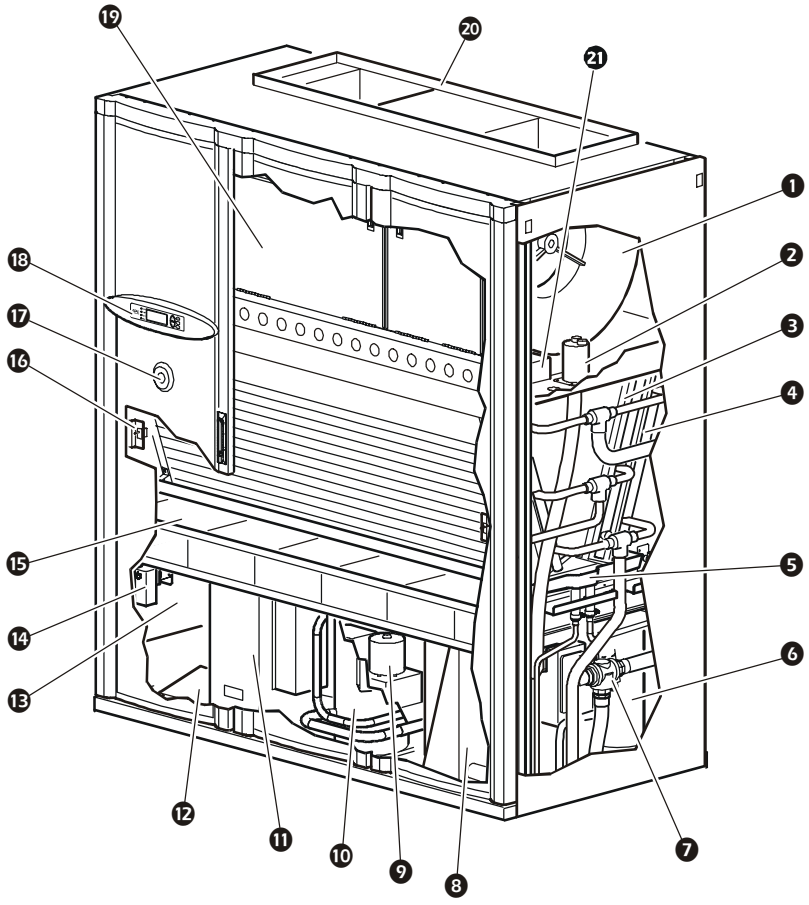
Customer Interface Modules
Each unit comes equipped with up to 3 additional discrete input/output modules. Each interface module is programmable with outputs that can map from any system alarm through the microprocessor controller. Inputs are capable of mapping to outputs as a system alarm or custom alarm.

Alarms

- High control temperature
- Low control temperature
- High control humidity
- Low control humidity
- Clogged filter
- Return sensor failure
- High supply temperature
- Low supply temperature
- Loss or low airflow
- Loss of water flow
- Supply sensor failure
- Water regulator actuator failure
- Econ/MultiCool Actuator failure
- High head pressure
- Low suction pressure
- Humidifier failure
- Replace humidifier canister
- Frequency controller failure
- Air block interlock open
- Water detected
- Fire (thermal sensor trip)
- Smoke detected
- Condensate pump failure

Upflow models

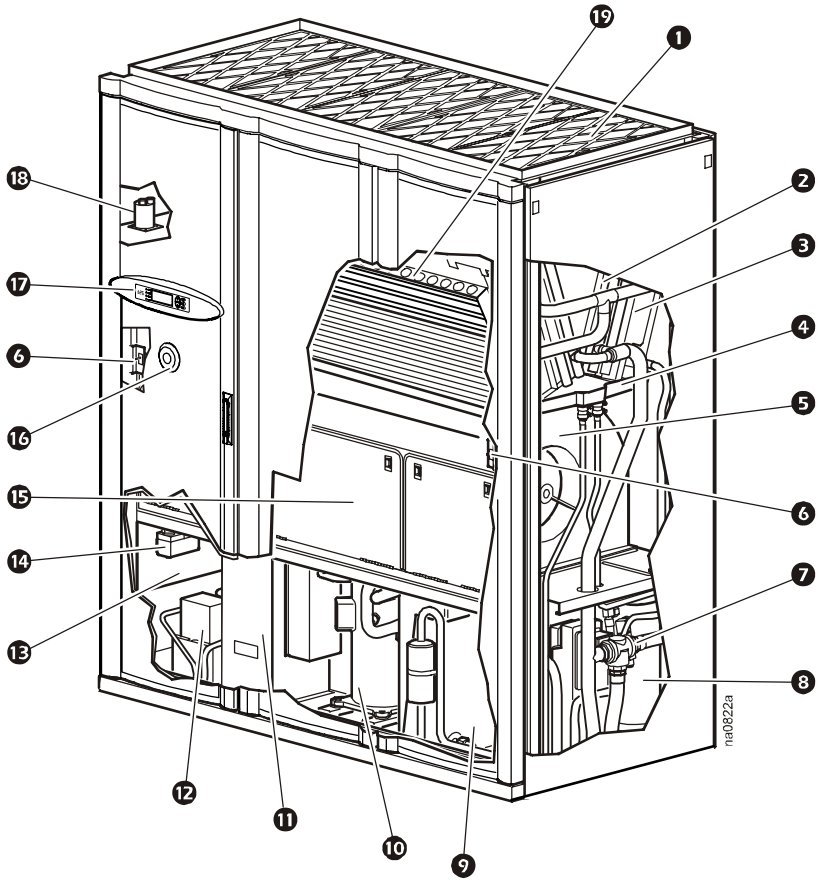
FM Upflow components



1. Motor and fan assembly
2. Steam head
3. DX coil
4. Economizer coil (optional)
5. Condensate pan
6. Liquid refrigerant receiver
7. 3-way ball valve
8. Brazed plate condenser (water and glycol models)
9. Condensate pump (optional)
10. Tandem compressors
11. Humidifier (optional)
12. Electrical junction box
13. User interface box
14. Firestat (optional)
15. Air filters
16. Fan interlock switch
17. Main power interrupt switch
18. Display interface
19. Electrical panel
20. Duct flange (optional)
21. Electric reheat coil (optional)

Downflow models

FM Downflow components



1. Air filters
2. Economizer coil (optional)
3. DX coil
4. Condensate pan
5. Motor and fan assembly
6. Fan interlock switch
7. 3-way ball valve
8. Liquid refrigerant receiver
9. Brazed plate condenser (water and glycol models)
10. Tandem compressors
11. Humidifier (optional)
12. Condensate pump (optional)
13. User interface box
14. Firestat (optional)
15. Electrical panel
16. Main power interrupt switch
17. Display interface
18. Steam head
19. Electric reheat coil (optional)

Performance Specifications—Air Cooled

NET COOLING MODE CAPACITY - BTU/HR*	FM 35	FM 50
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	125,000 (36.6)	195,000 (57.0)
Sensible	110,000 (32.3)	163,000 (47.9)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	114,000 (33.3)	178,000 (52.0)
Sensible	110,000 (32.3)	160,000 (46.6)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	114,000 (33.3)	176,000 (51.3)
Sensible	114,000 (33.3)	173,000 (50.6)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	109,000 (31.9)	169,000 (49.3)
Sensible**	105,000 (30.9)	155,000 (45.3)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	109,000 (31.9)	171,000 (50.0)
Sensible	109,000 (31.9)	171,000 (50.0)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	106,000 (30.9)	163,000 (47.9)
Sensible	102,000 (30.0)	150,000 (44.0)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	106,000 (30.9)	165,000 (48.3)
Sensible	106,000 (30.9)	165,000 (48.3)
NET DEHUMIDIFICATION MODE CAPACITY - BTU/HR (kW)		
72F DB, 62.7F WB (22.2C DB, 17.1C WB) 60% RH		
Total - 1 Compressor	55,000 (16.0)	87,000 (25.6)
Sensible - 1 Compressor	50,000 (14.6)	75,000 (21.9)
Total - 2 Compressors	104,000 (30.3)	157,000 (46.0)
Sensible - 2 Compressors	73,000 (21.3)	105,000 (30.6)
72F DB, 61.4F WB (22.2C DB, 16.3C WB) 55% RH		
Total - 1 Compressor	54,000 (15.6)	86,000 (25.3)
Sensible - 1 Compressor	54,000 (15.6)	84,000 (24.9)
Total - 2 Compressors	102,000 (29.9)	153,000 (44.9)
Sensible - 2 Compressors	80,000 (23.3)	113,000 (33.0)
70F DB, 59.7F WB (21.1C DB, 15.4C WB) 55% RH		
Total - 1 Compressor	53,000 (15.3)	84,000 (24.9)
Sensible - 1 Compressor	53,000 (15.3)	84,000 (24.9)
Total - 2 Compressors	99,000 (29.0)	150,000 (44.0)
Sensible - 2 Compressors	79,000 (23.0)	114,000 (33.3)
MULTICOOL -- NET COOLING CAPACITY DATA -- BTU/HR (kW) - 45F (7.2C) EWT*		
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	183,000 (53.6)	254,000 (74.3)
Sensible	140,000 (41.3)	196,000 (57.3)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	147,000 (43.3)	205,000 (60.0)
Sensible	129,000 (37.9)	181,000 (52.9)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	144,000 (42.0)	200,000 (58.3)
Sensible	137,000 (40.0)	191,000 (55.9)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	126,000 (36.9)	179,000 (52.6)
Sensible**	120,000 (35.0)	167,000 (48.9)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	120,000 (35.0)	168,000 (49.3)
Sensible	120,000 (35.0)	168,000 (49.3)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	117,000 (34.3)	162,000 (47.6)
Sensible	112,000 (32.9)	156,000 (45.6)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	110,000 (32.3)	154,000 (45.3)
Sensible	110,000 (32.3)	154,000 (45.3)
MULTICOOL REQUIREMENTS - CHILLED WATER, 45F (7.2C) EWT		
Water In -- GPM (L/s)	28.0 (1.8)	44.0 (2.8)
Pressure Drop -- PSI (kPa)	6.6 (45.5)	15.2 (104.8)

*** Rated Capacity +/-10%**

**** Nominal Rating Point**

Performance Specifications - Air Cooled

FM-DX	FM 35	FM 50
AIR SYSTEM -- DIRECT DRIVE CENTRIFUGAL		
Air Volume -- CFM (L/s)	6,000 (2,830)	9,000 (4,245)
Blower Motor -- HP (kW)	4 (3)	4 (3)
External Static Pressure -- inches of water (Pa)	0.5 (125)	0.5 (125)
Number of Blowers	2	2
COMPRESSOR -- TANDEM SCROLL		
EER	15.8	14.2
Quantity	2 (tandem)	2 (tandem)
Nominal HP (kW)	9.0 (6.71)	15.6 (11.64)
EVAPORATOR COIL -- V FRAME, COPPER TUBE/ALUMINUM FIN		
Face Area -- ft^2 (m^2)	21 (1.95)	21 (1.95)
Rows Deep	3	3
Face Velocity -- FPM (m/s)	286 (1.45)	428 (2.17)
HUMIDIFICATION --- SOLID STATE ELECTRODE CANISTER		
Flush Cycle	automatic	automatic
Capacity -- Lbs/hr (Kg/hr)	10 (4.53)	10 (4.53)
kW	3.2	3.2
FILTERS		
Quantity	5	5
Size -- Inches (mm)	12.8×29.0 (325×737)	12.8×29.0 (325 ×737)
Depth -- Inches (mm)	4 (100.8)	4 (100.8)
REHEAT		
Electric -- Equally Loaded Three (3) Phase, Finned Tubular, Low-Watt Density - SCR Controlled		
Capacity -- BTU/HR (kW) Includes Motor Heat* **	40,000 (11.6)	47,000 (13.8)
PHYSICAL DATA		
Weight -- lbs (kg)**	1180 (535)	1290 (585)
Height -- Inches (mm)	76.89 (1,953)	76.89 (1,953)
Length -- Inches (mm)	70.87 (1,800)	70.87 (1,800)
Depth -- Inches (mm)	35.00 (889)	35.00 (889)
CONNECTION SIZES***		
Air		
Liquid Line -- inches (od)	7/8	7/8
Discharge Line -- inches (od)	1-1/8	1-1/8
Humidifier		
Supply Line -- inches	1/4	1/4
Condensate Drain		
Drain Line -- inches	1/2	1/2
MultiCool		
Supply Line -- inches	1-1/2	1-1/2
Return Line -- inches	1-1/2	1-1/2

*****With equal loading on each phase, rated at 208-230V / 3-phase, 480V / 3-phase and 600V / 3-phase**
******Add 150lbs (68kg) when MultiCool option is selected**
*******Connection sizes, not recommended piping sizes**

Performance Specifications—Water Cooled

NET COOLING CAPACITY - BTU/HR*	FM 35	FM 50
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	134,000 (39.3)	210,000 (61.3)
Sensible	115,000 (33.6)	171,000 (50.3)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	123,000 (36.0)	192,000 (56.0)
Sensible	112,000 (32.9)	167,000 (48.9)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	122,000 (35.9)	189,000 (55.3)
Sensible	122,000 (35.9)	182,000 (53.3)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	117,000 (34.3)	182,000 (53.3)
Sensible**	109,000 (32.0)	162,000 (47.3)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	117,000 (34.3)	180,000 (52.6)
Sensible	117,000 (34.3)	175,000 (51.3)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	114,000 (33.3)	176,000 (51.6)
Sensible	106,000 (31.0)	157,000 (46.0)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	114,000 (33.3)	175,000 (51.3)
Sensible	114,000 (33.3)	170,000 (49.9)
NET DEHUMIDIFICATION MODE CAPACITY - BTU/HR (kW)		
72F DB, 62.7F WB (22.2C DB, 17.1C WB) 60% RH		
Total - 1 Compressor	60,000 (17.6)	95,000 (27.9)
Sensible - 1 Compressor	53,000 (15.6)	79,000 (23.0)
Total - 2 Compressors	113,000 (33.0)	169,000 (49.6)
Sensible - 2 Compressors	77,000 (22.6)	110,000 (32.0)
72F DB, 61.4F WB (22.2C DB, 16.3C WB) 55% RH		
Total - 1 Compressor	60,000 (17.6)	94,000 (27.6)
Sensible - 1 Compressor	60,000 (17.6)	89,000 (26.0)
Total - 2 Compressors	110,000 (32.0)	165,000 (48.3)
Sensible - 2 Compressors	83,000 (24.3)	118,000 (34.6)
70F DB, 59.7F WB (21.1C DB, 15.4C WB) 55% RH		
Total - 1 Compressor	57,000 (16.6)	91,000 (26.6)
Sensible - 1 Compressor	57,000 (16.6)	87,000 (25.3)
Total - 2 Compressors	107,000 (31.3)	162,000 (47.6)
Sensible - 2 Compressors	83,000 (24.6)	120,000 (35.3)
MULTICOOL -- NET COOLING CAPACITY DATA -- BTU/HR (kW) - 45 F (7.2 C) EWT*		
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	183,000 (53.6)	254,000 (74.3)
Sensible	140,000 (41.3)	196,000 (57.3)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	147,000 (43.3)	205,000 (60.0)
Sensible	129,000 (37.9)	181,000 (52.9)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	144,000 (42.0)	200,000 (58.3)
Sensible	137,000 (40.0)	191,000 (55.9)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	126,000 (36.9)	179,000 (52.6)
Sensible**	120,000 (35.0)	167,000 (48.9)
72F DB, 58.6 WB (22.2C DB, 14.8C WB) 45% RH		
Total	120,000 (35.0)	168,000 (49.3)
Sensible	120,000 (35.0)	168,000 (49.3)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	117,000 (34.3)	162,000 (47.6)
Sensible	112,000 (32.9)	156,000 (45.6)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	110,000 (32.3)	154,000 (45.3)
Sensible	110,000 (32.3)	154,000 (45.3)
MULTICOOL REQUIREMENTS - CHILLED WATER, 45F (7.2C) EWT		
Water In -- GPM (L/s)	28.0 (1.8)	44.0 (2.8)
Pressure Drop -- PSI (kPa)	6.6 (45.5)	15.2 (104.8)

***Rated Capacity +/-10%**

****Nominal Rating Point**

Performance Specifications—Water Cooled

FM-DX	FM 35	FM 50
ECONOMIZER -- NET COOLING CAPACITY DATA -- BTU/HR (kW) @ 45F (7.2C) EWT*		
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	185,000 (54.3)	264,000 (77.3)
Sensible	141,000 (41.3)	201,000 (58.9)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	149,000 (43.9)	211,000 (62.0)
Sensible	129,000 (37.9)	184,000 (53.9)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	146,000 (42.6)	205,000 (60.0)
Sensible	137,000 (40.3)	195,000 (57.3)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	131,000 (38.3)	183,000 (53.6)
Sensible**	120,000 (35.3)	170,000 (49.9)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	121,000 (35.6)	172,000 (50.6)
Sensible	121,000 (35.6)	172,000 (50.6)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	119,000 (34.6)	165,000 (48.6)
Sensible	113,000 (33.0)	159,000 (46.6)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	111,000 (32.6)	158,000 (46.3)
Sensible	111,000 (32.6)	158,000 (46.3)
COOLANT REQUIREMENTS		
THR -- MBH (kW)	162,000 (47.6)	263,000 (77.0)
85 F (29.4 C) Water In -- GPM (L/s)	29.5 (1.9)	47.9 (3.0)
Pressure Drop -- PSI (kPa)	5.4 (37.2)	8.4 (57.9)
Pressure Drop w/Econ Coil -- PSI (kPa)	8.8 (60.7)	17.1 (117.9)
WATER REGULATING VALVES		
Size -- 2 Way Ball Valve -- Inches, NPT (Cv)***	1-1/2 (35)	1-1/2 (35)
Size -- 3 Way Ball Valve -- Inches, NPT (Cv)****	1-1/2 (35)	1-1/2 (35)
AIR SYSTEM -- DIRECT DRIVE CENTRIFUGAL		
Air Volume -- CFM (L/s)	6,000 (2,830)	9,000 (4,245)
Blower Motor -- HP (kW)	4 (3)	4 (3)
External Static Pressure -- inches of water (Pa)	0.5 (125)	0.5 (125)
Number of Blowers	2	2
COMPRESSOR -- TANDEM SCROLLS		
EER	20.1	17.8
Quantity	2 (tandem)	2 (tandem)
Nominal HP (kW)	9.0 (6.71)	15.6 (ll.64)
EVAPORATOR COIL -- V FRAME, COPPER TUBE/ALUMINUM FIN		
Face Area -- ft^2 (m^2)	21 (1.95)	21 (1.95)
Rows Deep	3	3
Face Velocity -- FPM (m/s)	286 (1.45)	428 (2.17)
HUMIDIFICATION --- SOLID STATE ELECTRODE CANISTER		
Flush Cycle	automatic	automatic
Capacity -- Lbs/hr (Kg/hr)	10 (4.53)	10 (4.53)
kW	3.2	3.2
FILTERS		
Quantity	5	5
Size -- Inches (mm)	12.8×29.0 (325×737)	12.8×29.0 (325×737)
Depth -- Inches (mm)	4 (100.8)	4 (100.8)
REHEAT		
Electric -- Equally Loaded Three (3) Phase, Finned Tubular, Low-Watt Density		
Capacity -- BTU/HR (kW) Includes Motor Heat***	40,000 (11.6)	47,000 (13.8)
PHYSICAL DATA		
Weight -- lbs (kg)****	1220 (553)	1350 (612)
Height -- Inches (mm)	76.89 (1,953)	76.89 (1,953)
Length -- Inches (mm)	70.87 (1,800)	70.87 (1,800)
Depth -- Inches (mm)	35.00 (889)	35.00 (889)
CONNECTION SIZES*****		
Water In/Out -- Inches	1-1/2	1-1/2
Humidifier		
Supply Line -- Inches	1/4	1/4
Condensate Drain		
Drain Line -- Inches	1/2	1/2
MultiCool		
Supply Line -- Inches	1-1/2	1-1/2
Return Line -- Inches	1-1/2	1-1/2

*****2-Way Single Seated, 400 PSI W.W.P. max**
******3-Way Single Seated, 400 PSI W.W.P. max**
*******With equal loading on each phase, rated at 208-230V / 3-phase, 480V / 3-phase and 600V / 3-phase**
********Add 150lbs (68kg) when Economizer or MultiCool option is selected**
*********Connection sizes, not recommended piping sizes. All water/steam piping is nominal.**

Performance Specifications—Glycol Cooled

NET COOLING CAPACITY - BTU/HR*	FM 35	FM 50
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	121,000 (35.6)	190,000 (55.6)
Sensible	109,000 (31.9)	161,000 (47.3)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	112,000 (32.6)	173,000 (50.9)
Sensible	108,000 (31.6)	157,000 (46.0)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	111,000 (32.6)	175,000 (51.3)
Sensible	111,000 (32.6)	175,000 (51.3)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	106,000 (31.0)	164,000 (48.0)
Sensible**	104,000 (30.6)	152,000 (44.3)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	107,000 (31.3)	167,000 (48.9)
Sensible	107,000 (31.3)	167,000 (48.9)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	103,000 (30.0)	159,000 (46.6)
Sensible	100,000 (29.3)	148,000 (43.3)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	103,000 (30.0)	161,000 (47.3)
Sensible	103,000 (30.0)	161,000 (47.3)
NET DEHUMIDIFICATION MODE CAPACITY - BTU/HR (kW)		
72F DB, 62.7F WB (22.2C DB, 17.1C WB) 60% RH		
Total - 1 Compressor	53,000 (15.6)	84,000 (24.6)
Sensible - 1 Compressor	49,000 (14.3)	73,000 (21.3)
Total - 2 Compressors	102,000 (29.9)	153,000 (44.6)
Sensible - 2 Compressors	72,000 (21.0)	103,000 (30.0)
72F DB, 61.4F WB (22.2C DB, 16.3C WB) 55% RH		
Total - 1 Compressor	52,000 (15.3)	85,000 (24.9)
Sensible - 1 Compressor	52,000 (15.3)	85,000 (24.9)
Total - 2 Compressors	99,000 (29.0)	149,000 (43.6)
Sensible - 2 Compressors	78,000 (22.9)	112,000 (32.9)
70F DB, 59.7F WB (21.1C DB, 15.4C WB) 55% RH		
Total - 1 Compressor	51,000 (14.9)	82,000 (23.9)
Sensible - 1 Compressor	51,000 (14.9)	82,000 (23.9)
Total - 2 Compressors	96,000 (28.0)	146,000 (42.6)
Sensible - 2 Compressors	78,000 (22.9)	112,000 (32.9)
MULTICOOL -- NET COOLING CAPACITY DATA -- BTU/HR (kW) - 45F (7.2C) EWT*		
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	183,000 (53.6)	254,000 (74.3)
Sensible	140,000 (41.3)	196,000 (57.3)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	147,000 (43.3)	205,000 (60.0)
Sensible	129,000 (37.9)	181,000 (52.9)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	144,000 (42.0)	200,000 (58.3)
Sensible	137,000 (40.0)	191,000 (55.9)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	126,000 (36.9)	179,000 (52.6)
Sensible**	120,000 (35.0)	167,000 (48.9)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	120,000 (35.3)	168,000 (49.3)
Sensible	120,000 (35.3)	168,000 (49.3)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	117,000 (34.3)	162,000 (47.6)
Sensible	112,000 (32.9)	156,000 (45.6)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	110,000 (32.3)	154,000 (45.3)
Sensible	110,000 (32.3)	154,000 (45.3)
MULTICOOL REQUIREMENTS - CHILLED WATER, 45F (7.2C) EWT		
Water In -- GPM (L/s)	28.0 (1.8)	44.0 (2.8)
Pressure Drop -- PSI (kPa)	6.6 (45.5)	15.2 (104.8)

***Rated Capacity +/-10%**

****Nominal Rating Point**

Performance Specifications—Glycol Cooled

FM-DX	FM 35	FM 50
ECONOMIZER -- NET COOLING CAPACITY DATA -- BTU/HR (kW) @ 45F (7.2C) EWT*		
80F DB, 67F WB (26.7C DB, 19.4C WB) 50% RH		
Total	102,000 (29.9)	169,000 (49.6)
Sensible	102,000 (29.9)	160,000 (46.9)
75F DB, 62.5F WB (23.9C DB, 16.9C WB) 50% RH		
Total	87,000 (25.6)	137,000 (40.0)
Sensible	87,000 (25.6)	137,000 (40.0)
75F DB, 61F WB (23.9C DB, 16.1C WB) 45% RH		
Total	87,000 (25.6)	137,000 (40.0)
Sensible	87,000 (25.6)	137,000 (40.0)
72F DB, 60F WB (22.2C DB, 15.5C WB) 50% RH		
Total	77,000 (22.3)	120,000 (35.0)
Sensible**	77,000 (22.3)	120,000 (35.0)
72F DB, 58.6 WB (22.2D DB, 14.8C WB) 45% RH		
Total	77,000 (22.3)	120,000 (35.0)
Sensible	77,000 (22.3)	120,000 (35.0)
70F DB, 58.5F WB (21.1C DB, 14.8C WB) 50% RH		
Total	70,000 (20.3)	109,000 (31.9)
Sensible	70,000 (20.3)	109,000 (31.9)
70F DB, 57.2F WB (21.1C DB, 14.0C WB) 45% RH		
Total	70,000 (20.3)	109,000 (31.9)
Sensible	70,000 (20.3)	109,000 (31.9)
COOLANT REQUIREMENTS		
THR -- MBH (kW)	166,000 (48.6)	271,000 (79.6)
105 F (40.6 C) Glycol In -- GPM (L/s)	24.5 (1.5)	40.1 (2.5)
Pressure Drop w/HX -- PSI (kPa)	2.2 (15.2)	4.3 (29.6)
Pressure Drop w/HX, Econ Coil -- PSI (kPa)	4.5 (31.0)	11.4 (78.6)
WATER REGULATING VALVES		
Size -- 2 Way Ball Valve -- Inches, NPT (Cv)***	1-1/2 (35)	1-1/2 (35)
Size -- 3 Way Ball Valve -- Inches, NPT (Cv)****	1-1/2 (35)	1-1/2 (35)
AIR SYSTEM -- DIRECT DRIVE CENTRIFUGAL		
Air Volume -- CFM (L/s)	6,000 (2,830)	9,000 (4,245)
Blower Motor -- HP (kW)	4 (3)	4 (3)
External Static Pressure -- inches of water (Pa)	0.5 (125)	0.5 (125)
Number of Blowers	2	2
COMPRESSOR -- TANDEM SCROLL		
EER	14.5	13.2
Quantity	2 (tandem)	2 (tandem)
Nominal HP (kW)	9.0 (6.71)	15.6 (11.64)
EVAPORATOR COIL -- V FRAME, COPPER TUBE/ALUMINUM FIN		
Face Area -- ft^2 (m^2)	21 (1.95)	21 (1.95)
Rows Deep	3	3
Face Velocity -- FPM (m/s)	286 (1.45)	428 (2.17)
HUMIDIFICATION --- SOLID STATE ELECTRODE CANISTER		
Flush Cycle	automatic	automatic
Capacity -- Lbs/hr (Kg/hr)	10 (4.53)	10 (4.53)
kW	3.2	3.2
FILTERS		
Quantity	5	5
Size -- Inches (mm)	12.8×29.0 (325×737)	12.8×29.0 (325×737)
Depth -- Inches (mm)	4 (100.8)	4 (100.8)
REHEAT		
Electric -- Equally Loaded Three (3) Phase, Finned Tubular, Low-Watt Density		
Capacity -- BTU/HR (kW) Includes Motor Heat***	40,000 (11.6)	47,000 (13.8)
PHYSICAL DATA		
Weight -- lbs (kg)****	1220 (553)	1350 (612)
Height -- Inches (mm)	76.89 (1,953)	76.89 (1,953)
Length -- Inches (mm)	70.87 (1,800)	70.87 (1,800)
Depth -- Inches (mm)	35.00 (889)	35.00 (889)
CONNECTION SIZES*****		
Glycol In/Out -- Inches	1-1/2	1-1/2
Humidifier		
Supply Line -- Inches	1/4	1/4
Condensate Drain		
Drain Line -- Inches	1/2	1/2
MultiCool		
Supply Line -- Inches	1-1/2	1-1/2
Return Line -- Inches	1-1/2	1-1/2

*****2-Way Single Seated, 400 PSI W.W.P. max**
******3-Way Single Seated, 400 PSI W.W.P. max**
*******With equal loading on each phase, rated at 208-230V / 3-phase, 480V / 3-phase and 600V / 3-phase**
********Add 150lbs (68kg) when Economizer or MultiCool option is selected**
*********Connection sizes, not recommended piping sizes. All water/steam piping is nominal**

Electrical Data

AIR COOLED				
REHEAT	**Electric**			
HUMIDIFIER	**Electrode Canister - Steam**			
VOLTAGE	**208**	**230**	**480**	**600**
FM 35				
OA-w/DX	59.7	58.4	27.8	23.0
OA-w/DX&MultiCool	61.1	59.6	28.4	23.5
MCA	92.0	92.0	40.6	33.9
MOP	100.0	100.0	50.0	35.0
FM 50				
OA-w/DX	96.1	91.3	45.5	36.5
OA-w/DX&MultiCool	99.7	94.5	47.0	37.8
MCA	132.2	132.2	66.4	49.7
MOP	150.0	150.0	70.0	50.0
WATER COOLED				
REHEAT	**Electric**			
HUMIDIFIER	**Electrode Canister - Steam**			
VOLTAGE	**208**	**230**	**480**	**600**
FM 35				
OA-w/DX	56.6	55.6	26.0	21.6
OA-w/DX&MultiCool	58.0	56.8	26.6	22.1
MCA	92.0	92.0	46.0	33.9
MOP	100.0	100.0	50.0	35.0
FM 50				
OA-w/DX	90.6	86.3	43.2	34.5
OA-w/DX&MultiCool	94.2	89.5	44.8	35.8
MCA	132.2	132.2	66.4	49.7
MOP	150.0	150.0	70.0	50.0
GLYCOL COOLED				
REHEAT	**Electric**			
HUMIDIFIER	**Electrode Canister - Steam**			
VOLTAGE	**208**	**230**	**480**	**600**
FM 35				
OA-w/DX	61.1	59.6	28.6	23.7
OA-w/DX&MultiCool	62.4	60.8	29.2	24.2
MCA	92.0	92.0	40.6	33.9
MOP	100.0	100.0	50.0	35.0
FM 50				
OA-w/DX	98.3	93.3	46.2	37.3
OA-w/DX&MultiCool	101.9	96.5	47.8	38.6
MCA	132.2	132.2	66.4	49.7
MOP	150.0	150.0	70.0	50.0

OA = Operating Amps, MCA = Wire Size Amps, MOP = Maximum Overcurrent Protection

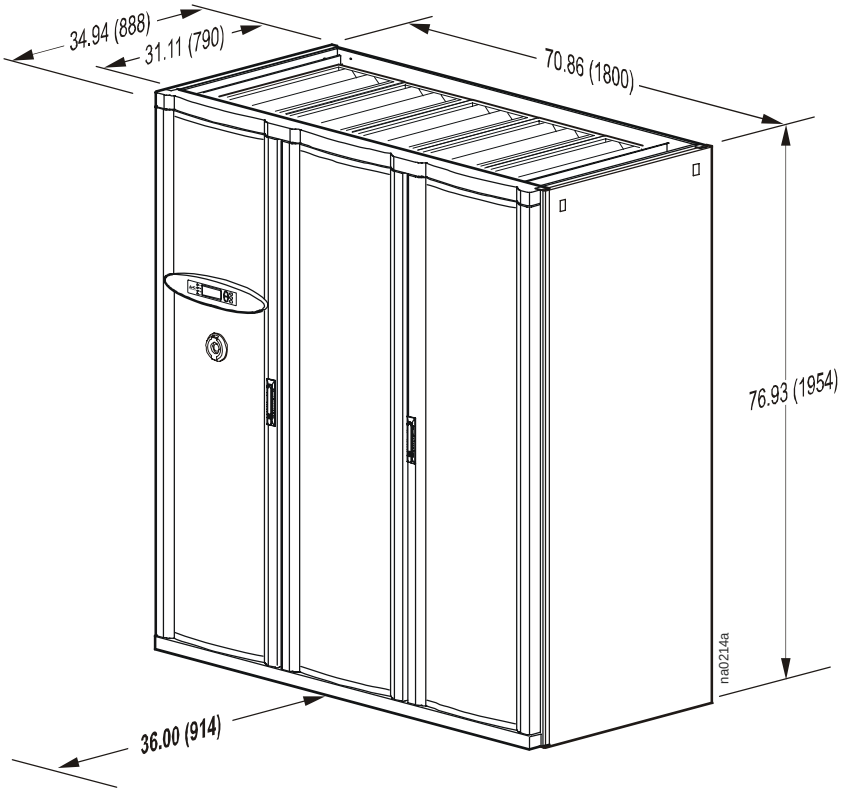
Locked Rotor Amps (LRA)

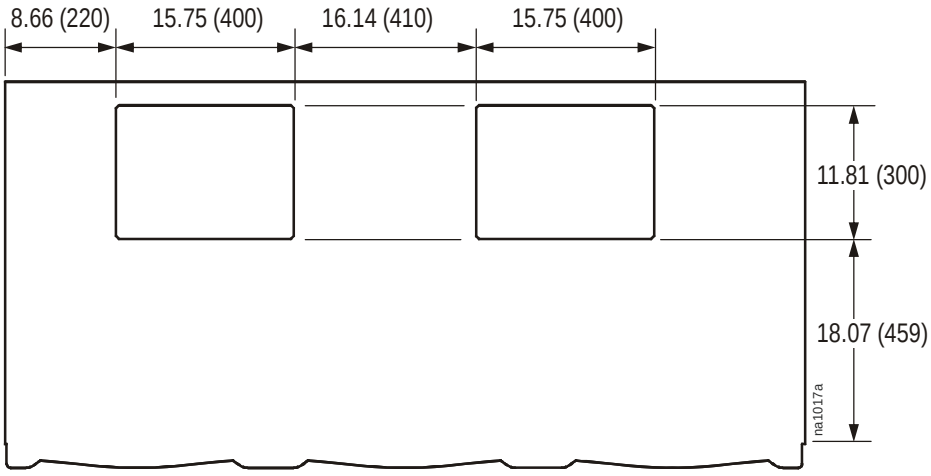
VOLTAGE	FM 35	FM 50
208-230/3/60	123.0	195.0
480/3/60	49.5	95.0
600/3/60	40.0	80.0

*** LRA data based on tandem compressors**

Dimensional Data

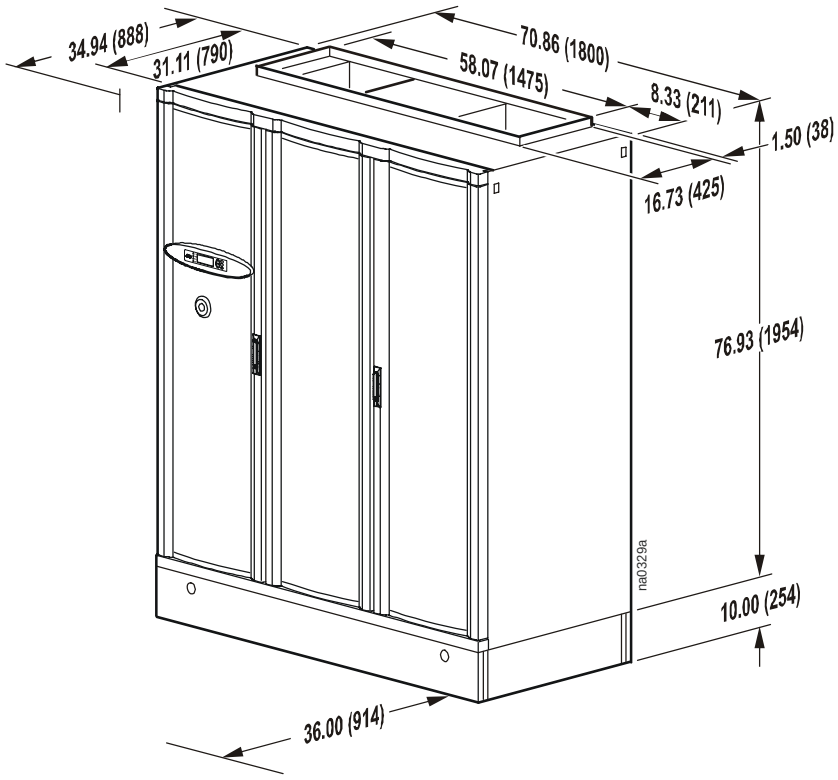
FM Downflow





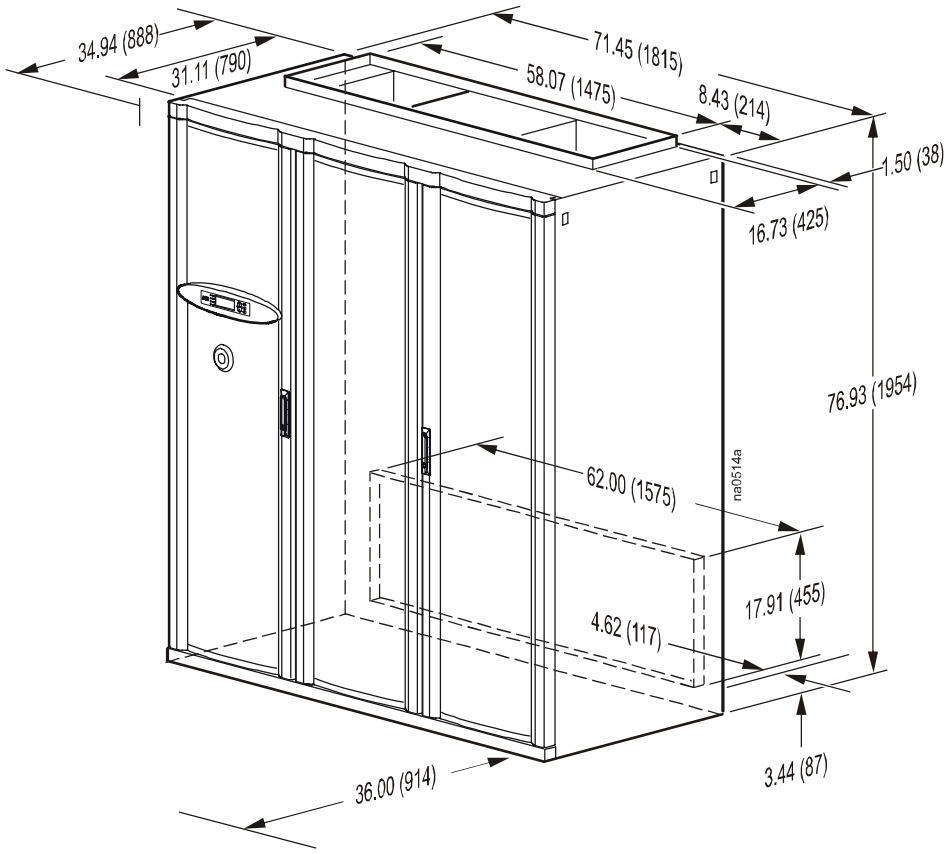
* All dimensions are in inches (mm).

FM Upflow

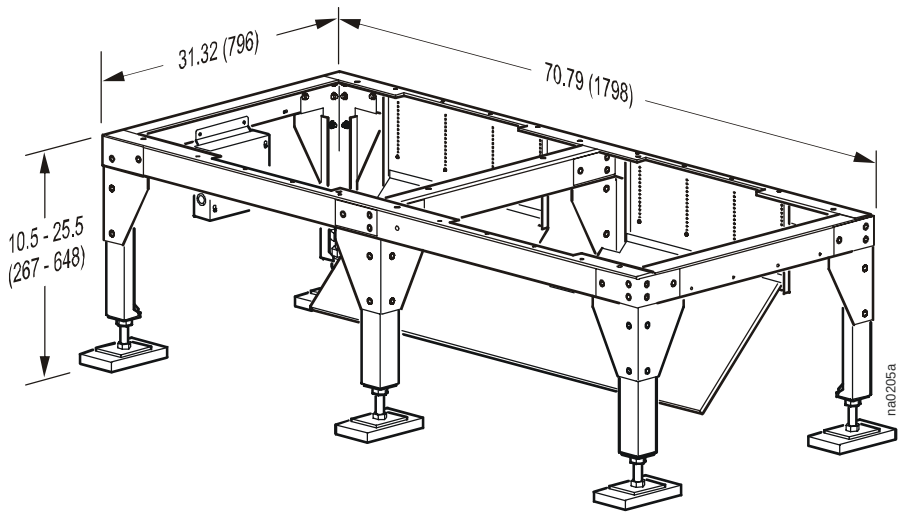


* All dimensions are in inches (mm).

FM upflow, rear-return

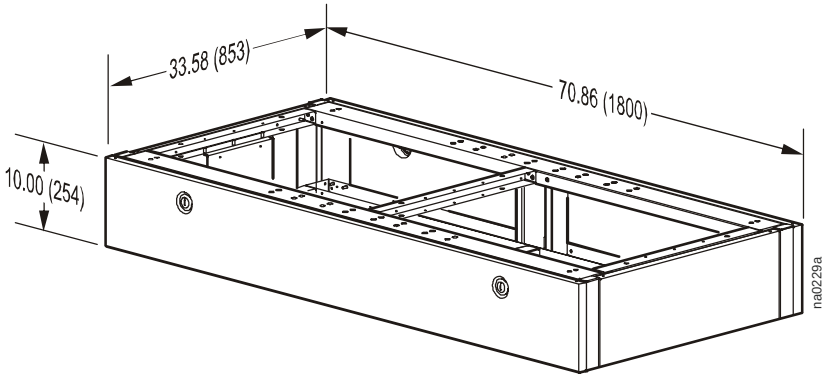

34.94 (888)
31.11 (790)
71.45 (1815)
58.07 (1475)
8.43 (214)
1.50 (38)
16.73 (425)
76.93 (1954)
62.00 (1575)
17.91 (455)
4.62 (117)
3.44 (87)
36.00 (914)
na0514a

FM Floorstand

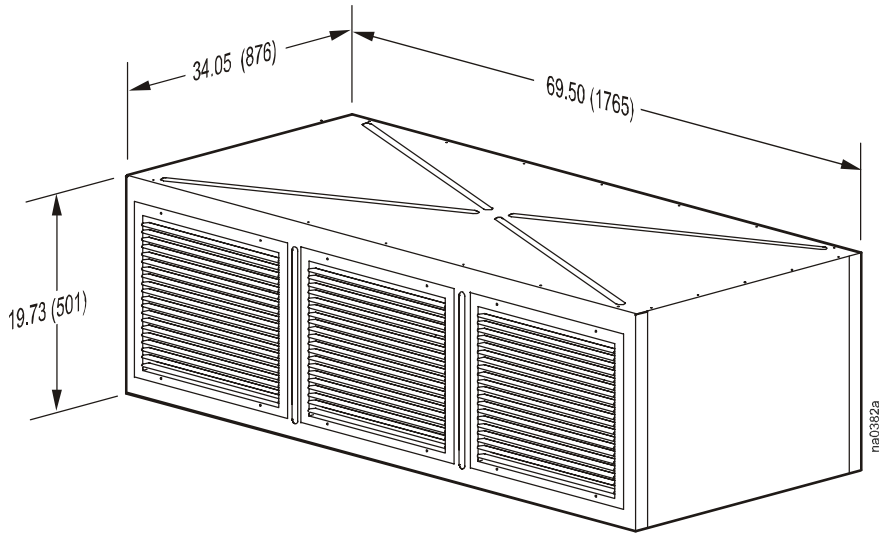


Orderable Floorstand Height	Range
12” (FM35)	Adjustable 10.5”-13.5”
15” (FM35)	Adjustable 13.5”-16.5”
18”	Adjustable 16.5”-19.5”
21”	Adjustable 19.5”-22.5”
24”	Adjustable 22.5”-25.5”

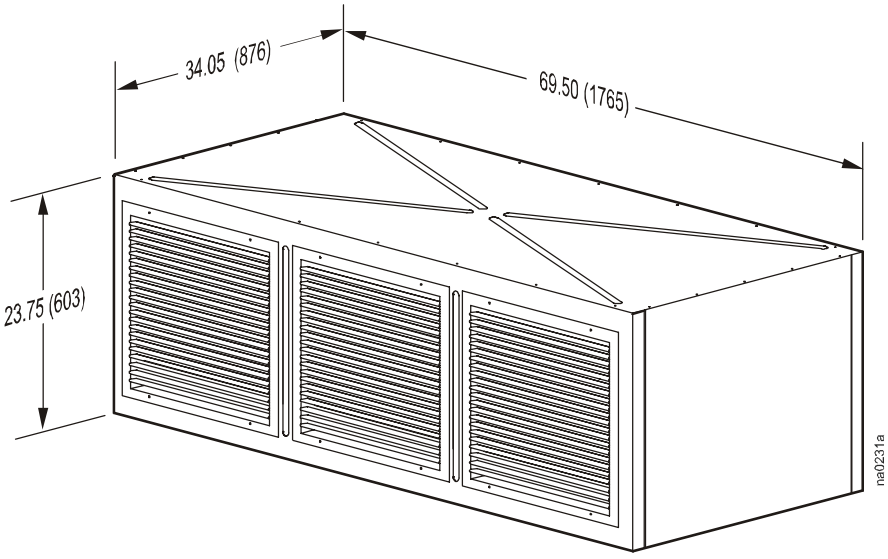
FM Sub-Base



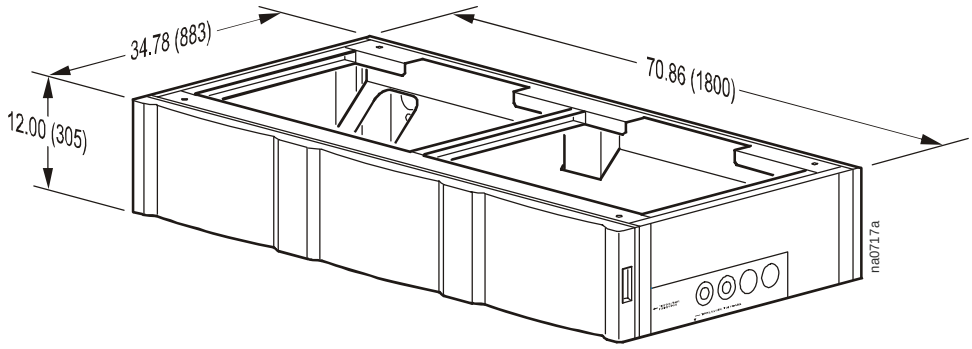
FM 20” Upflow Plenum



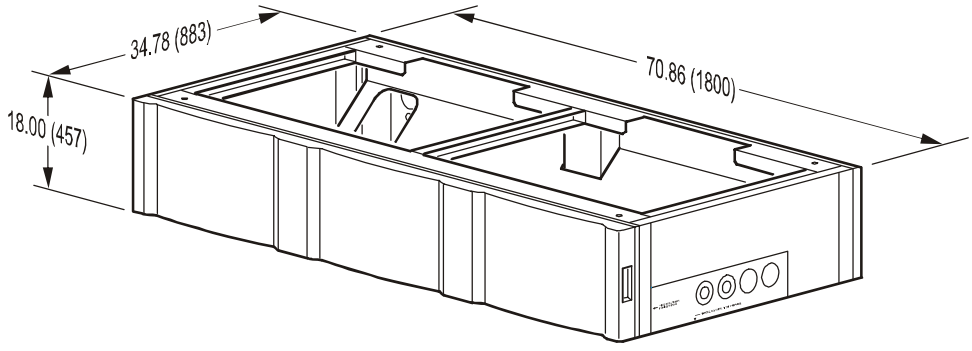
FM 24” Upflow Plenum



FM35 12” Downflow Plenum



FM50 18” Downflow Plenum



Air-Cooled Condensers

Air-cooled condenser—performance/electrical data

OHE SKU	Voltage	Ambient Temperature			Air Quantity		Fan/Motor			Connection Size (inches)		Weight		Electrical Data		
		95F	105F	115F	CFM	L/s	Qty.	HP	RPM	Hot Gas	Liquid	Lbs	Kg	FLA	MCA	MOP
ACCD75028	208-230/1/60	FM 35	N/A	N/A	13,700	6,466	2	1/2	1075	1-1/8	7/8	510	231	8.7	15.0	15.0
ACCD75029	208-230/3/60	FM 35	N/A	N/A	13,700	6,466	2	1/3	1140	1-1/8	7/8	510	231	7.4	15.0	15.0
ACCD75030	480/3/60	FM 35	N/A	N/A	13,700	6,466	2	1/3	1140	1-1/8	7/8	510	231	3.7	15.0	15.0
ACCD75031	600/3/60	FM 35	N/A	N/A	13,700	6,466	2	1/3	1140	1-1/8	7/8	510	231	2.7	15.0	15.0
ACCD75036	208-230/1/60	N/A	FM 35	N/A	20,500	9,675	3	1/2	1075	1-5/8	1-1/8	550	249	8.7	15.0	15.0
ACCD75037	208-230/3/60	N/A	FM 35	N/A	20,500	9,675	3	1/3	1140	1-5/8	1-1/8	550	249	7.4	15.0	15.0
ACCD75038	480/3/60	N/A	FM 35	N/A	20,500	9,675	3	1/3	1140	1-5/8	1-1/8	550	249	3.7	15.0	15.0
ACCD75039	600/3/60	N/A	FM 35	N/A	20,500	9,675	3	1/3	1140	1-5/8	1-1/8	550	249	2.7	15.0	15.0
ACCD75049	208-230/3/60	FM 50	N/A	N/A	23,000	10,855	2	1-1/2	1140	1-3/8	1-3/8	730	331	11.8	15.8	35.0
ACCD75050	480/3/60	FM 50	N/A	N/A	23,000	10,855	2	1-1/2	1140	1-3/8	1-3/8	730	331	5.9	15.0	15.0
ACCD75051	600/3/60	FM 50	N/A	N/A	23,000	10,855	2	1-1/2	1140	1-3/8	1-3/8	730	331	4.5	15.0	15.0
ACCD75040	208-230/3/60	N/A	FM 50	FM 35	20,700	9,769	2	1-1/2	1140	1-5/8	1-5/8	880	399	11.8	15.8	35.0
ACCD75041	480/3/60	N/A	FM 50	FM 35	20,700	9,769	2	1-1/2	1140	1-5/8	1-5/8	880	399	5.9	15.0	15.0
ACCD75042	600/3/60	N/A	FM 50	FM 35	20,700	9,769	2	1-1/2	1140	1-5/8	1-5/8	880	399	4.5	15.0	15.0
ACCD75052	208-230/3/60	N/A	N/A	FM 50	46,400	21,898	4	1-1/2	1140	2-1/8	2-1/8	1,580	715	25.8	29.8	45.0
ACCD75053	480/3/60	N/A	N/A	FM 50	46,400	21,898	4	1-1/2	1140	2-1/8	2-1/8	1,580	715	12.9	15.0	20.0
ACCD75054	600/3/60	N/A	N/A	FM 50	46,400	21,898	4	1-1/2	1140	2-1/8	2-1/8	1,580	715	10.1	15.0	15.0

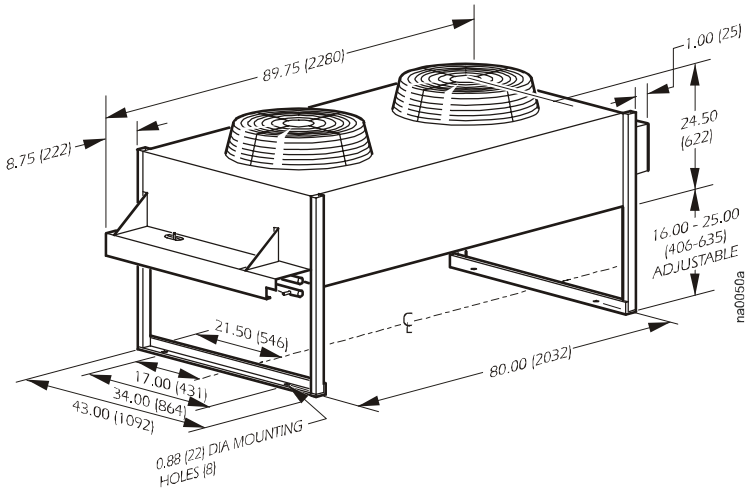
*Specifications given for conditions at sea level.
FLA = Full Load Amps
MCA = Minimum Circuit Amperes
MOP = Maximum Overcurrent Protection

Low noise air-cooled condenser—performance/electrical data

OHE SKU	Voltage	Ambient Temperature			Air Quantity		Fan/Motor			Connection Size (inches)		Weight		Electrical Data		
		95F	105F	115F	CFM	L/s	Qty.	HP	RPM	Hot Gas	Liquid	Lbs	Kg	FLA	MCA	MOP
ACCD75055	208-230/3/60	FM 35	FM 35	N/A	11,700	5,522	2	1/2	540	1-5/8	1-5/8	800	363	8.3	15.0	20.0
ACCD75056	480/3/60	FM 35	FM 35	N/A	11,700	5,522	2	1/2	540	1-5/8	1-5/8	800	363	4.2	15.0	15.0
ACCD75061	208-230/3/60	FM 50	N/A	N/A	18,500	8,731	3	1/2	540	1-5/8	1-5/8	1180	535	11.8	15.6	25.0
ACCD75062	480/3/60	FM 50	N/A	N/A	18,500	8,731	3	1/2	540	1-5/8	1-5/8	1180	535	5.9	15.0	15.0
ACCD75058	208-230/3/60	N/A	N/A	FM 35	17,100	8,070	3	1/2	540	1-5/8	1-5/8	1240	562	11.8	15.6	25.0
ACCD75059	480/3/60	N/A	N/A	FM 35	17,100	8,070	3	1/2	540	1-5/8	1-5/8	1240	562	5.9	15.0	15.0
ACCD75070	208-230/3/60	N/A	FM 50	N/A	24,600	11,610	4	1/2	540	2-1/8	2-1/8	1580	717	15.3	20.4	30.0
ACCD75071	480/3/60	N/A	FM 50	N/A	24,600	11,610	4	1/2	540	2-1/8	2-1/8	1580	717	7.7	15.0	15.0
ACCD75073	208-230/3/60	N/A	N/A	FM 50	29,300	13,828	5	1/2	540	2-1/8	2-1/8	2000	907	18.8	25.2	35.0
ACCD75074	480/3/60	N/A	N/A	FM 50	29,300	13,828	5	1/2	540	2-1/8	2-1/8	2000	907	9.4	15.0	15.0

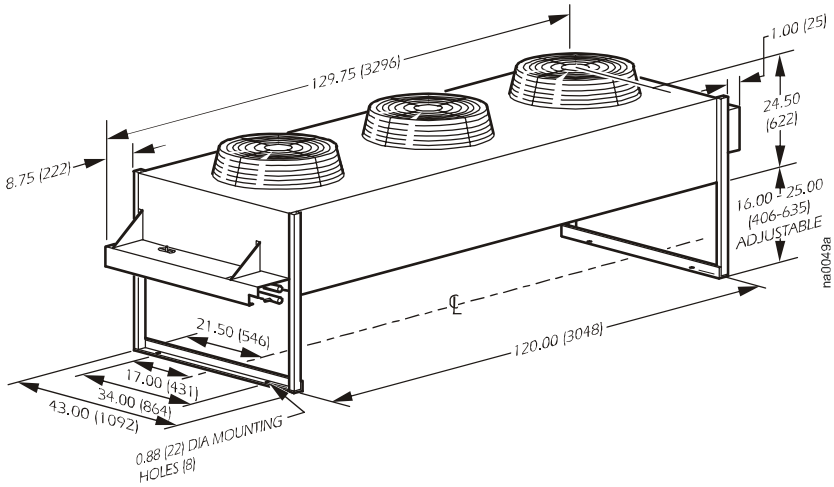
*Specifications given for conditions at sea level.
FLA = Full Load Amps
MCA = Minimum Circuit Amperes
MOP = Maximum Overcurrent Protection

2-fan air-cooled condenser



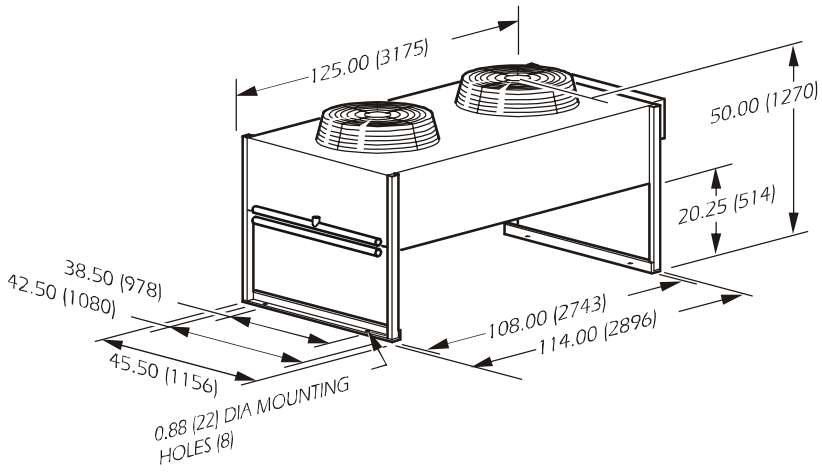
APC PART	CIRCUIT	VOLTAGE
ACCD75028	single	208-230/1/60
ACCD75029	single	208-230/3/60
ACCD75030	single	480/3/60
ACCD75031	single	600/3/60

3-fan air-cooled condenser



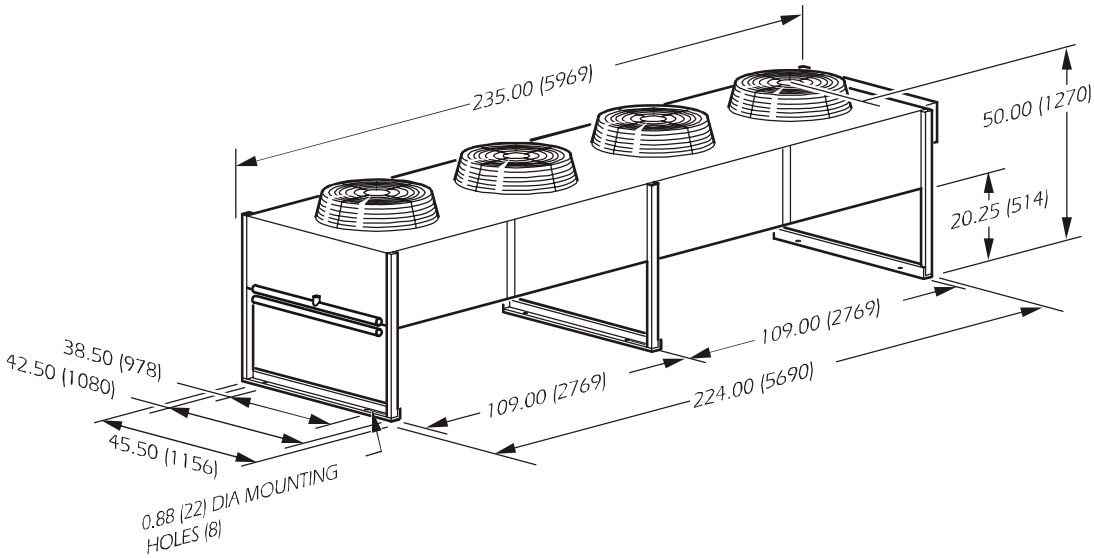
APC PART	CIRCUIT	VOLTAGE
ACCD75036	single	208-230/1/60
ACCD75037	single	208-230/3/60
ACCD75038	single	480/3/60
ACCD75039	single	600/3/60

2-fan air-cooled condenser



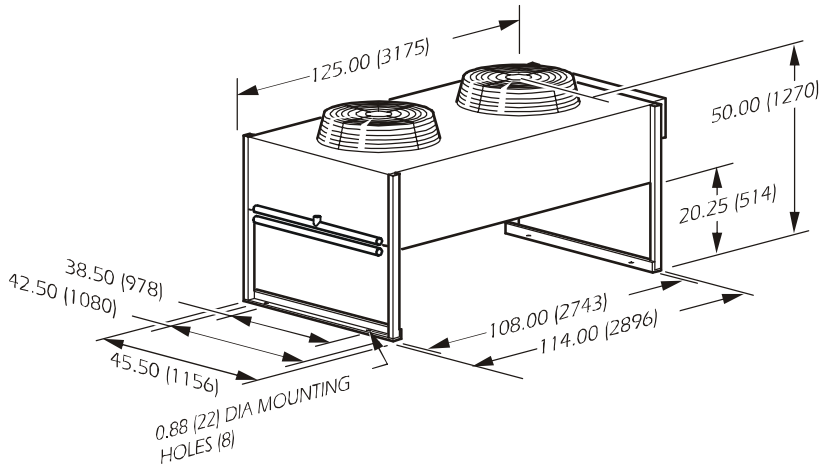
APC PART	CIRCUIT	VOLTAGE
ACCD75040	single	208-230/3/60
ACCD75041	single	480/3/60
ACCD75042	single	600/3/60
ACCD75049	single	208-230/3/60
ACCD75050	single	480/3/60
ACCD75051	single	600/3/60

4-fan air-cooled condenser



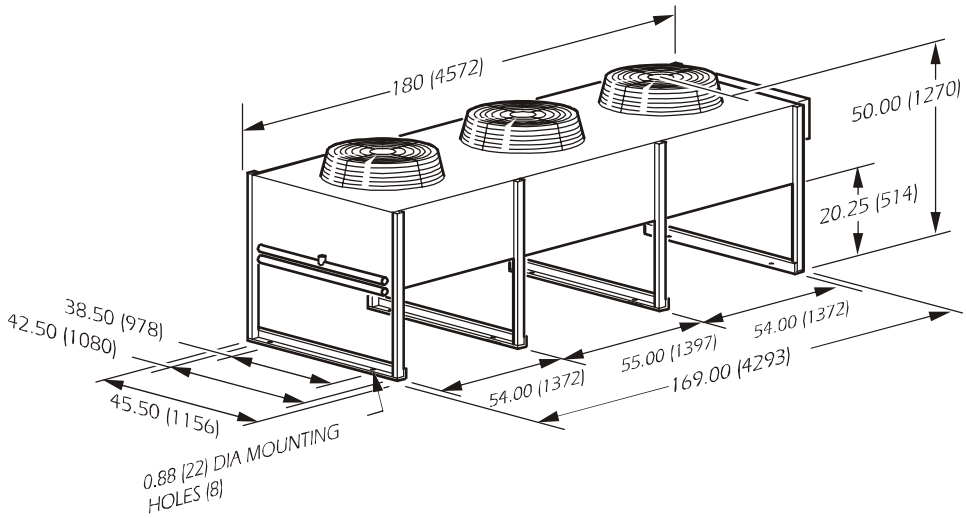
APC PART	CIRCUIT	VOLTAGE
ACCD75052	single	208-230/3/60
ACCD75053	single	480/3/60
ACCD75054	single	600/3/60

2-fan low-noise condenser



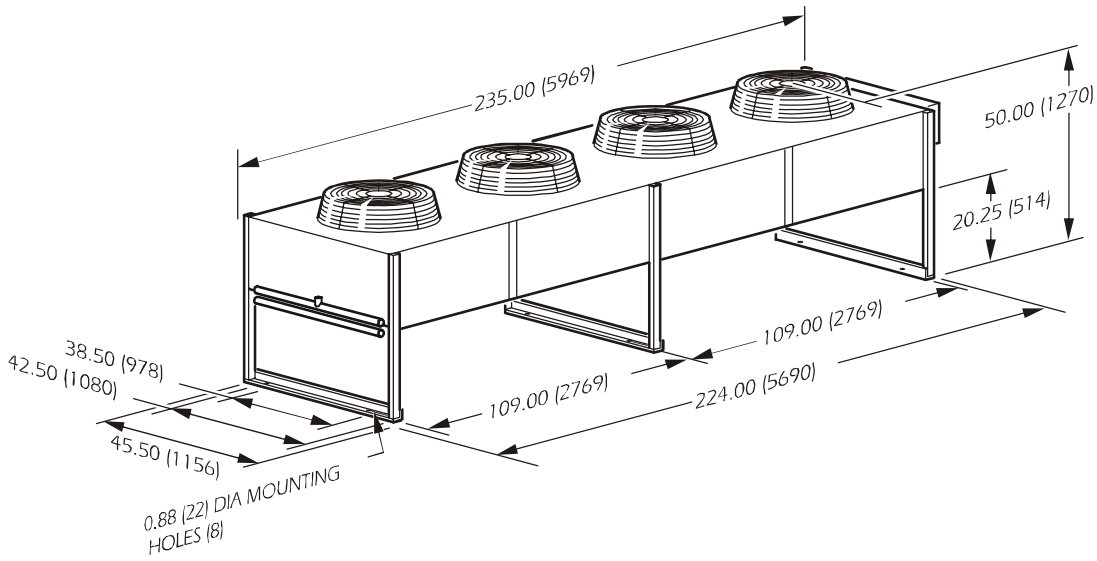
APC PART	CIRCUIT	VOLTAGE
ACCD75055	single	208-230/3/60
ACCD75056	single	480/3/60

3-fan low-noise condenser



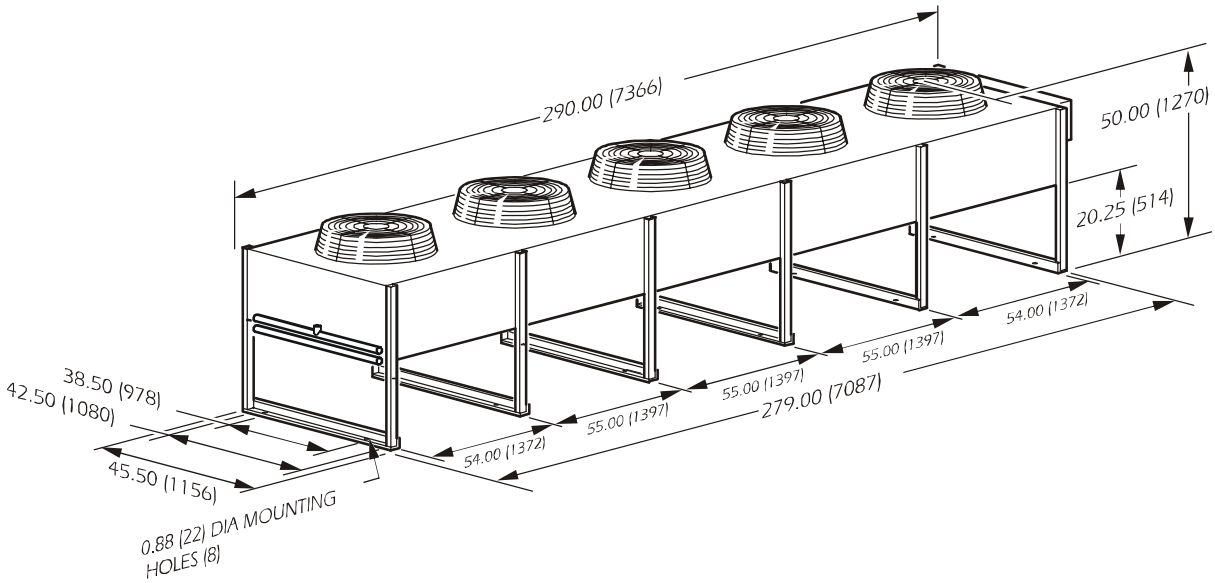
APC PART	CIRCUIT	VOLTAGE
ACCD75058	single	208-230/3/60
ACCD75059	single	480/3/60
ACCD75061	single	208-230/3/60
ACCD75062	single	480/3/60

4-fan low-noise condenser



APC PART	CIRCUIT	VOLTAGE
ACCD75070	single	208-230/3/60
ACCD75071	single	480/3/60

5-fan low-noise condenser



APC PART	CIRCUIT	VOLTAGE
ACCD75073	single	208-230/3/60
ACCD75074	single	480/3/60

Fluid Coolers

Glycol-cooled fluid cooler—performance/electrical data

OHE SKU	Voltage	Ambient Temperature		40% Ethylene Glycol @130F	Air Quantity		Fan/Motor			Connect-ion Size (inches)	Weight		Glycol Volume		Electrical Data		
		95F	105F	PD(ft) @GPM	CFM	L/s	Qty	HP	RPM		Lbs	Kg	Gal	L	FLA	MCA	MOP
ACFC75126	208-230/1/60	FM35	N/A	14.0@30	20,500	9,675	3	1/2	1075	(2) 2-1/8	550	250	10.2	37.7	11.7	12.7	15.0
ACFC75198	208-230/3/60	FM35	N/A	14.0@30	20,500	9,675	3	1/2	1140	(2) 2-1/8	550	250	10.2	37.7	7.8	8.5	15.0
ACFC75199	480/3/60	FM35	N/A	14.0@30	20,500	9,675	3	1/2	1140	(2) 2-1/8	550	250	10.2	37.7	3.9	4.2	15.0
ACFC75129	600/3/60	FM35	N/A	14.0@30	20,500	9,675	3	1/2	1140	(2) 2-1/8	550	250	10.2	37.7	3.1	3.4	15.0
ACFC75132	208-230/3/60	N/A	FM35	7.4@25	21,900	10,336	2	1-1/2	1140	(2) 2-1/8	790	359	9.2	34.8	14.0	15.8	20.0
ACFC75133	480/3/60	N/A	FM35	7.4@25	21,900	10,336	2	1-1/2	1140	(2) 2-1/8	790	359	9.2	34.8	7.0	7.9	15.0
ACFC75134	600/3/60	N/A	FM35	7.4@25	21,900	10,336	2	1-1/2	1140	(2) 2-1/8	790	359	9.2	34.8	5.6	6.3	15.0
ACFC75202	208-230/3/60	FM50	N/A	4.6@30	34,800	16,424	3	1-1/2	1140	(2) 2-5/8	1190	540	13.0	49.1	21.0	22.8	25.0
ACFC75203	480/3/60	FM50	N/A	4.6@30	34,800	16,424	3	1-1/2	1140	(2) 2-5/8	1190	540	13.0	49.1	10.5	11.4	15.0
ACFC75143	600/3/60	FM50	N/A	4.6@30	34,800	16,424	3	1-1/2	1140	(2) 2-5/8	1190	540	13.0	49.1	8.4	9.1	15.0
ACFC75167	208-230/3/60	N/A	FM50	4.8@40	43,900	20,718	4	1-1/2	1140	(2) 2-1/8	1620	735	18.5	70.0	28.0	29.8	35.0
ACFC75168	480/3/60	N/A	FM50	4.8@40	43,900	20,718	4	1-1/2	1140	(2) 2-1/8	1620	735	18.5	70.0	14.0	14.9	15.0
ACFC75169	600/3/60	N/A	FM50	4.8@40	43,900	20,718	4	1-1/2	1140	(2) 2-1/8	1620	735	18.5	70.0	11.2	11.9	15.0

FLA = Full Load Amps
MCA = Minimum Circuit Amperes
MOP = Maximum Overcurrent Protection

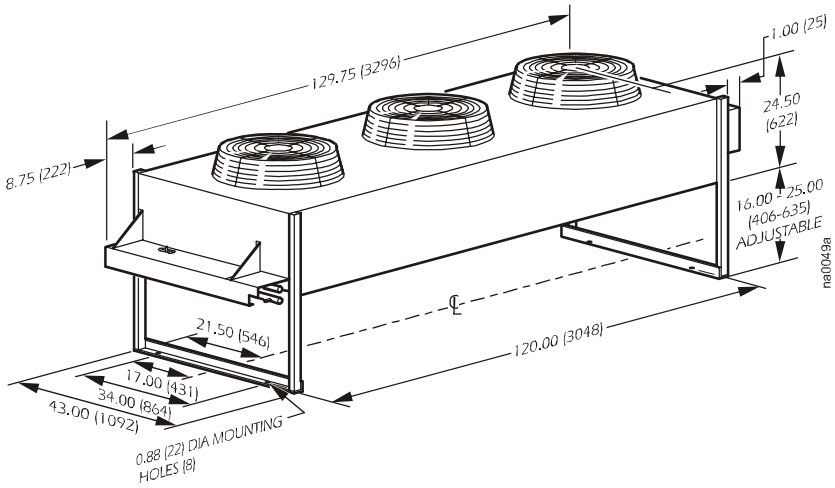
Low noise glycol-cooled fluid cooler—performance/electrical data

OHE SKU	Voltage	Ambient Temperature		40% Ethylene Glycol @130F	Air Quantity		Fan/Motor			Connect-ion Size (inches)	Weight		Glycol Volume		Electrical Data		
		95F	105F	PD(ft) @GPM	CFM	L/s	Qty	HP	RPM		Lbs	Kg	Gal	L	FLA	MCA	MOP
ACFC75155	208-230/3/60	FM35	N/A	10.7@25	18,500	8,731	3	1/2	540	2-5/8	1190	540	13.0	49.1	10.5	11.4	15.0
ACFC75156	480/3/60	FM35	N/A	10.7@25	18,500	8,731	3	1/2	540	2-5/8	1190	540	13.0	49.1	5.3	5.7	15.0
ACFC75158	208-230/3/60	N/A	FM35	7.7@40	17,500	8,259	3	1/2	540	2-5/8	1210	550	13.0	49.1	10.5	11.4	15.0
ACFC75159	480/3/60	N/A	FM35	7.7@40	17,500	8,259	3	1/2	540	2-5/8	1210	550	13.0	49.1	5.3	5.7	15.0
ACFC75161	208-230/3/60	FM50	N/A	6.1@30	24,600	11,610	4	1/2	540	2-5/8	2480	1125	16.7	63.1	14.0	14.9	15.0
ACFC75162	480/3/60	FM50	N/A	6.1@30	24,600	11,610	4	1/2	540	2-5/8	2480	1125	16.7	63.1	7.0	7.4	15.0
ACFC75164	208-230/3/60	N/A	FM50	10.1@40	23,400	11,043	4	1/2	540	2-5/8	3150	1430	16.7	63.1	14.0	14.9	15.0
ACFC75165	480/3/60	N/A	FM50	10.1@40	23,400	11,043	4	1/2	540	2-5/8	3150	1430	16.7	63.1	7.0	7.4	15.0

FLA = Full Load Amps
MCA = Minimum Circuit Amperes
MOP = Maximum Overcurrent Protection

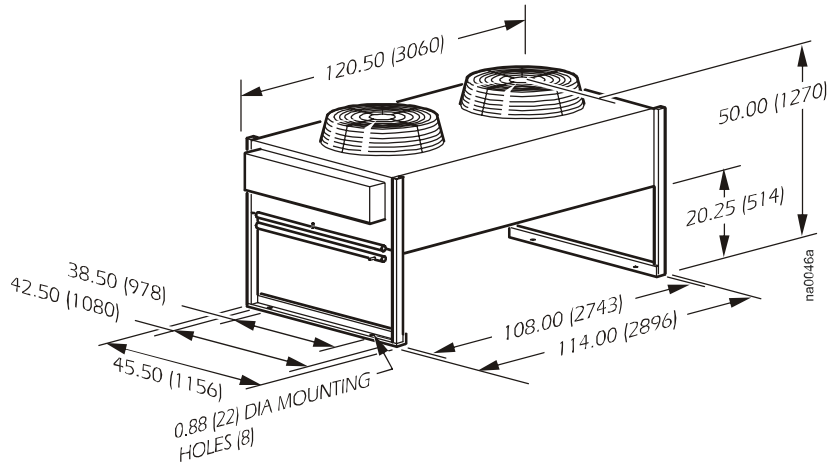
*Fluid coolers can be selected for multiple indoor air conditioning units from the factory. Consult factory for help configuring many-to-one or one-to-many glycol loops.

3-fan fluid cooler



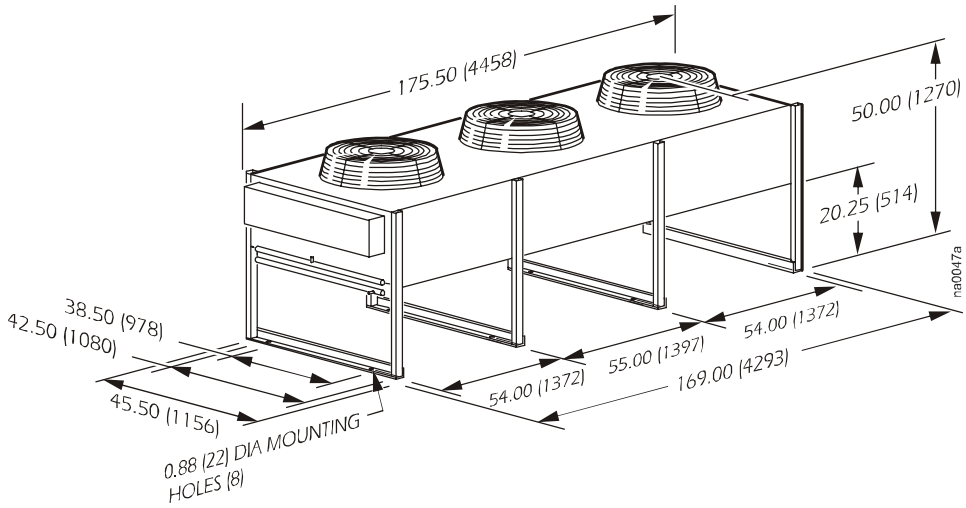
APC PART	VOLTAGE
ACFC75126	208-230/1/60
ACFC75198	208-230/3/60
ACFC75199	480/3/60
ACFC75129	600/3/60

2-fan fluid cooler



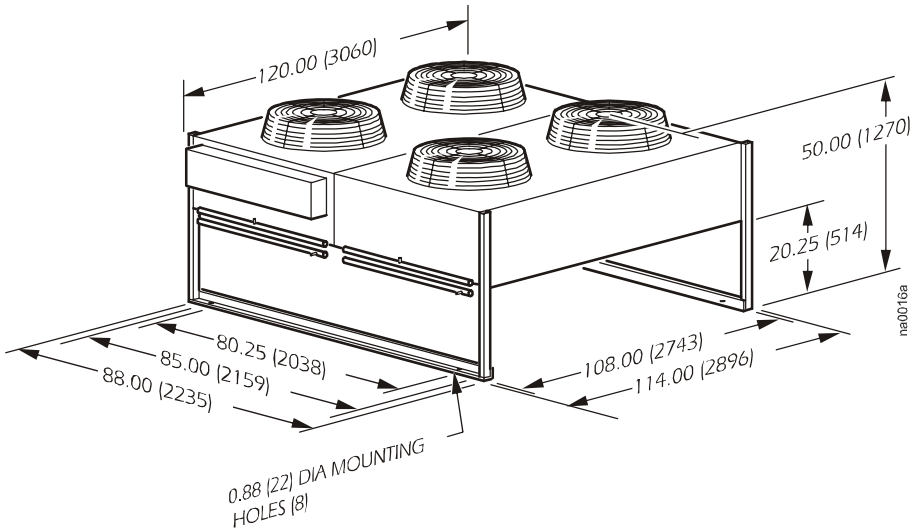
APC PART	VOLTAGE
ACFC75132	208-230/1/60
ACFC75133	208-230/3/60
ACFC75134	480/3/60

3-fan fluid cooler



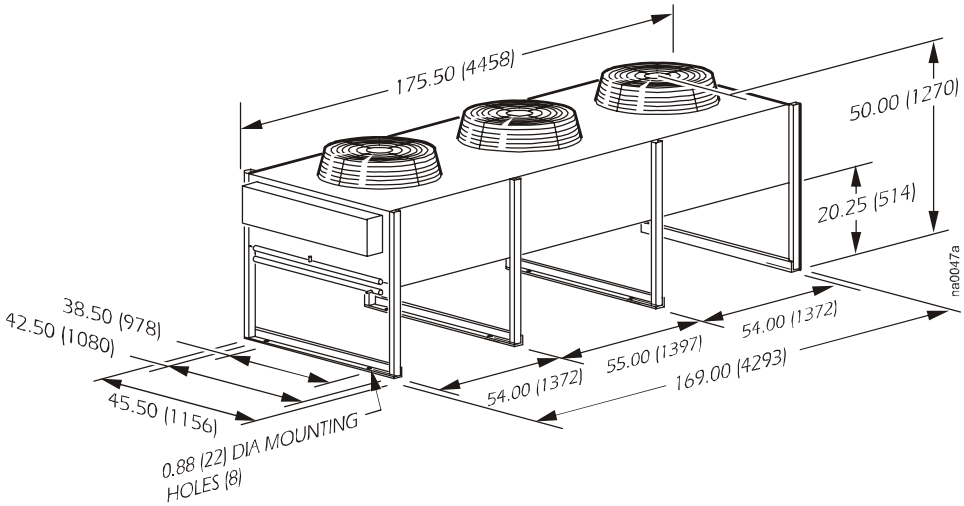
APC PART	VOLTAGE
ACFC75202	208-230/3/60
ACFC75203	480/3/60
ACFC75143	600/3/60

4-fan fluid cooler



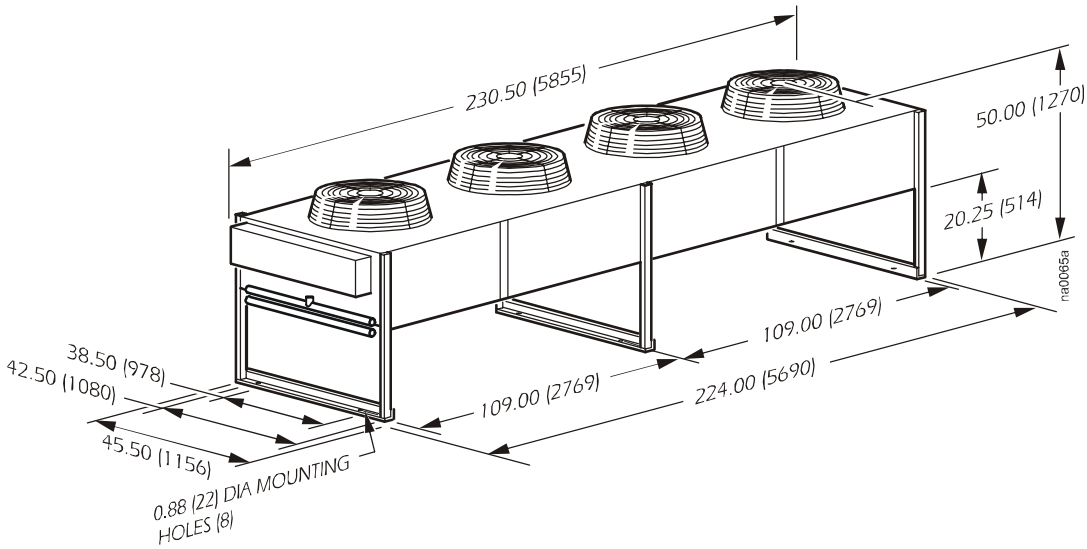
APC PART	VOLTAGE
ACFC75167	208-230/3/60
ACFC75168	480/3/60
ACFC75169	600/3/60

3-fan low-noise fluid cooler



APC PART	VOLTAGE
ACFC75158	208-230/3/60
ACFC75159	480/3/60
ACFC75155	208-230/3/60
ACFC75156	480/3/60

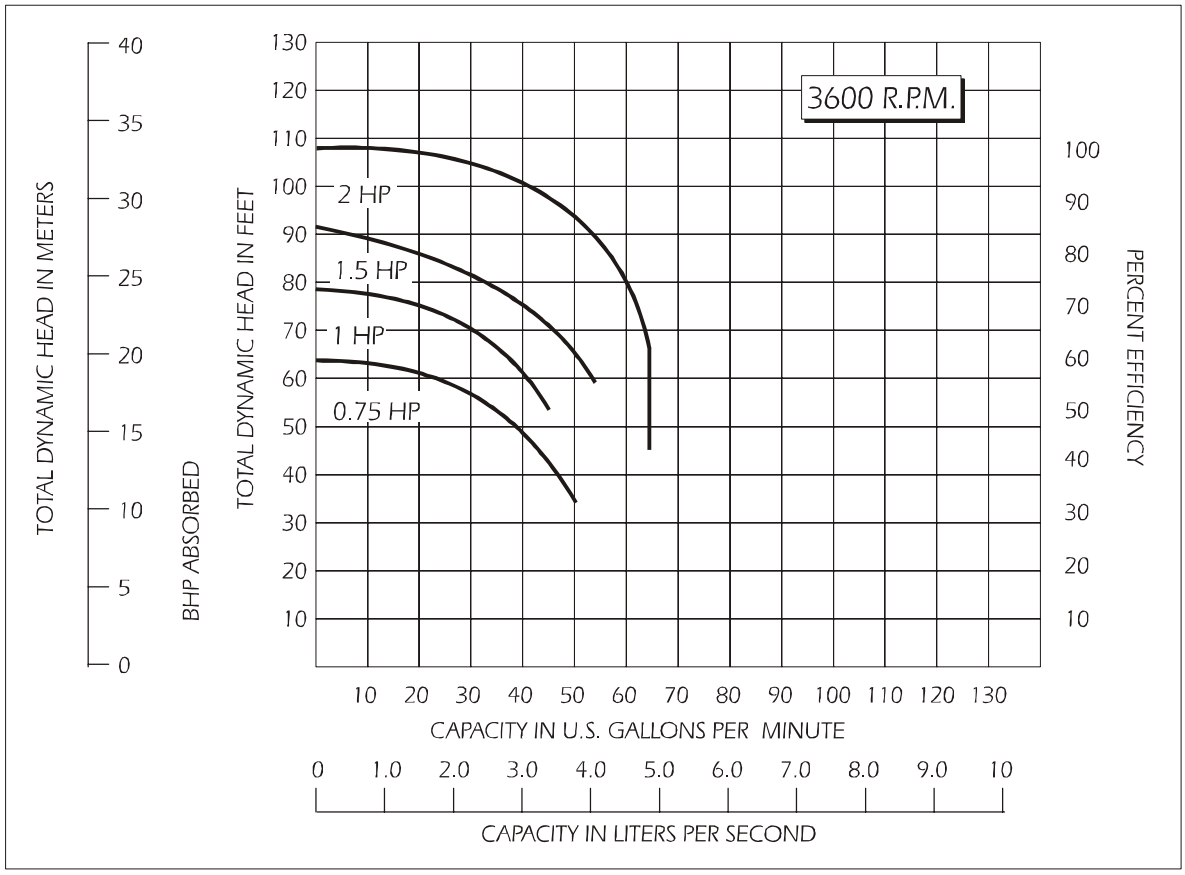
4-fan low-noise fluid cooler



APC PART	VOLTAGE
ACFC75164	208-230/3/60
ACFC75165	480/3/60
ACFC75161	208-230/3/60
ACFC75162	480/3/60

Pump Specifications

Pump performance



Pump connection sizes

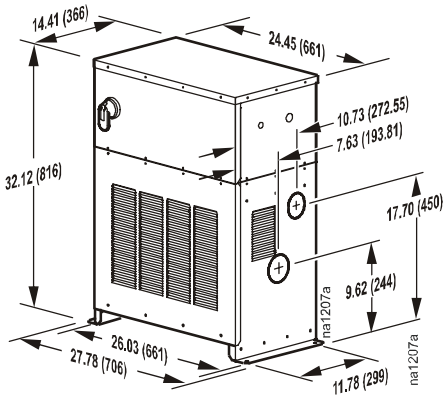
HP (kW)	3/4 (.56)		1 (.75)		1.5 (1.1)		2 (1.5)	
LINE	Suction	Discharge	Suction	Discharge	Suction	Discharge	Suction	Discharge
Size (inches)	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/2	1-1/4

Pump electrical data

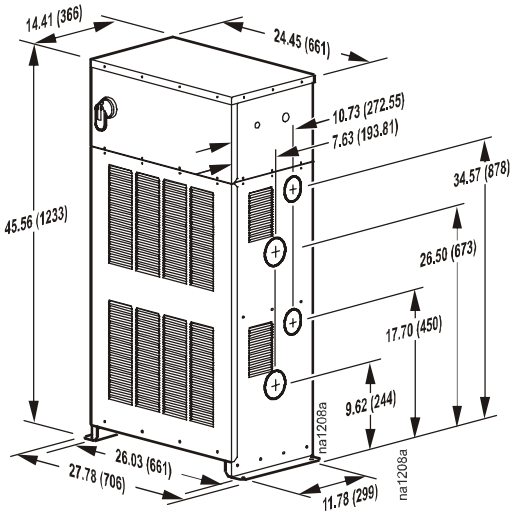
HP (kW)	3/4 (.56)		1 (.75)		1.5 (1.1)		2 (1.5)	
VOLTAGE	FLA	MCA	FLA	MCA	FLA	MCA	FLA	MCA
208/3/60	3.0	3.2	3.7	4.6	4.9	6.1	6.4	8.0
230/3/60	3.2	4.0	3.7	4.6	5.0	6.3	6.2	7.8
480/3/60	1.6	2.0	1.9	2.4	2.5	3.1	3.1	3.9
600/3/60	1.3	1.6	1.5	1.9	2.0	2.5	2.5	3.1

*Values are calculated based on 3-phase power.
FLA = Full Load Amperes
MCA = Minimum Circuit Amperes

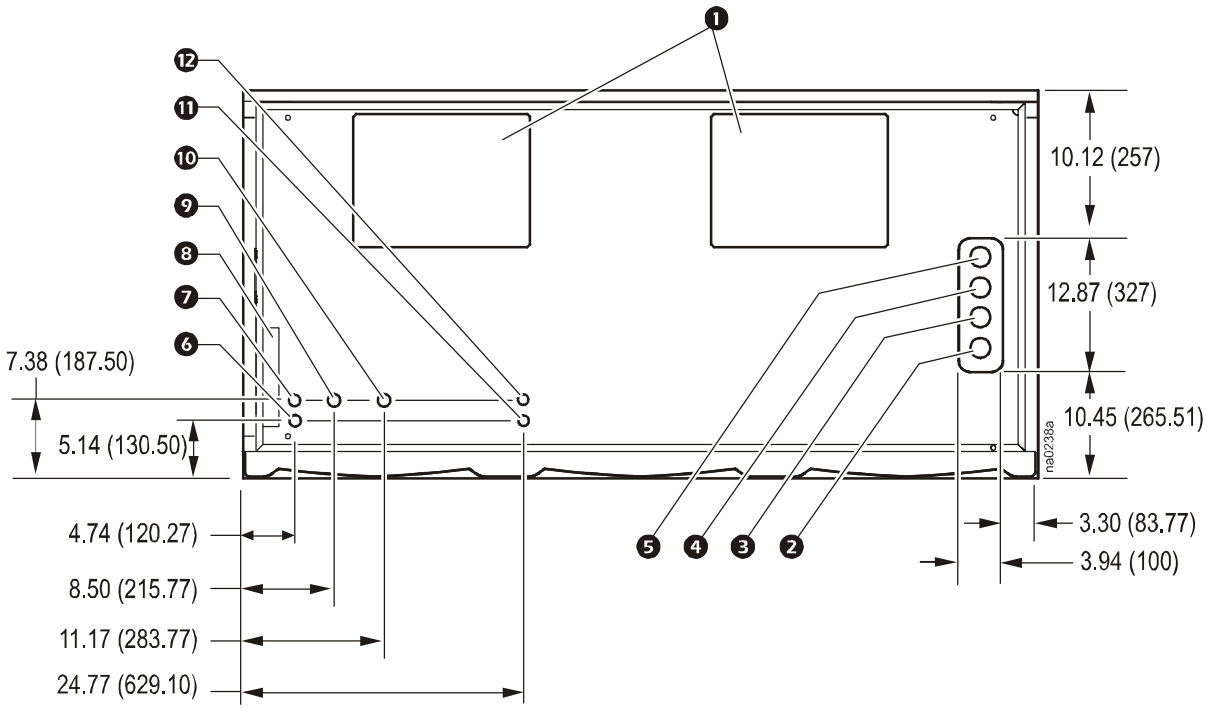
FM Single Pump Package



FM Dual Pump Package



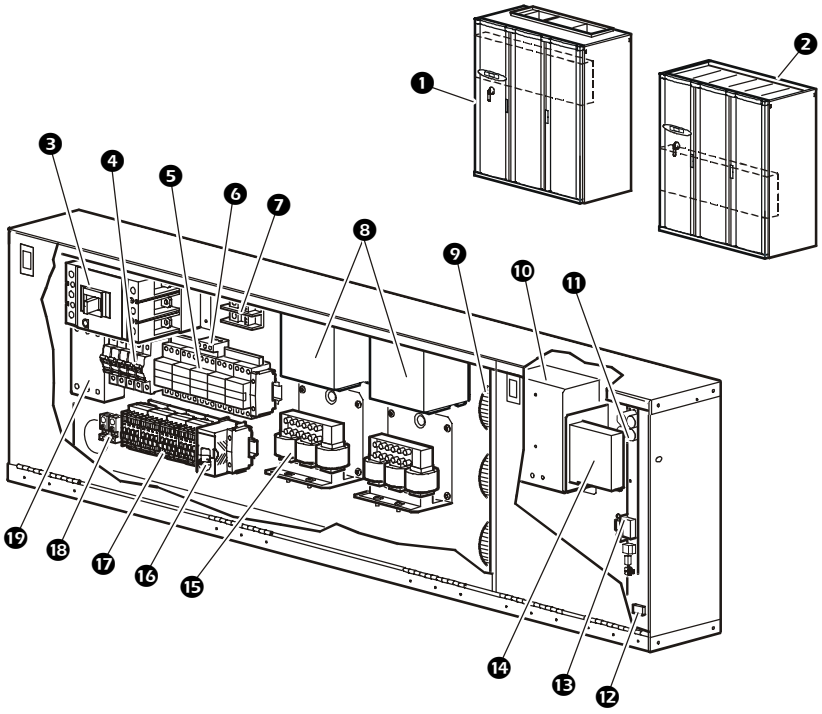
Piping Connections



❶	Air outlets (downflow only)	❼	Main power
❷	Water/glycol out or hot gas	❽	Control interface box
❸	Water/glycol in or liquid line in	❾	UPS power
❹	MultiCool or hot water out	❿	Condensate drain
❺	MultiCool or hot water in	⓫	Additional Control Access
❻	Control interface access	⓬	Humidifier fill

*Dimensions are shown in inches (millimeters)

Electrical Connections



1. Upflow Module
2. Downflow Module
3. Main circuit breaker
4. Circuit breakers
5. Fuses
6. Input power terminal block
7. Terminal block
8. Motor inverter/frequency controller
9. Control transformers
10. Smoke detector
11. Controller board
12. DIP switches
13. DB-9 connector/RS232 console port
14. Card slot
15. AC line reactor
16. Heater fuse block
17. Contactors
18. Ground lug
19. Reheat SCR control

Guide Specifications

PART 1 — PART 1 GENERAL

1.01 SUMMARY

A. The environmental control system shall be designed specifically for precision temperature and humidity control applications. It will automatically monitor and control heating, cooling, humidifying, dehumidifying, and filtering functions for the conditioned space. The system shall be built to the highest quality engineering and manufacturing standards, and shall be floor mounted and configured for ____(up/down) discharge of conditioned airflow, with draw-through air pattern, to provide uniform air distribution over the entire face of the coil.

1.02 DESIGN REQUIREMENTS

A. The system shall be as described in the following specification as manufactured by APC.

1. Model: _____.
2. Total cooling capacity: _____ MBH (kW).
3. Sensible cooling capacity: _____ MBH (kW).
4. Return air temperature: _____ º F (º C) DB.
5. Return air temperature: _____ º F (º C) WB.
6. Humidity: _____% RH.
7. Air quantity: _____ CFM (L/s).
8. External Static Pressure _____inches (Pa).
9. Humidifier capacity: _____ lbs/hr (kg/hr).
10. Electrical supply: _____ V, _____ ph, 60 Hz.

1.03 SUBMITTALS

A. Submittals shall be provided with the proposal and shall include: capacity data, electrical data, physical data, electrical connection drawing, and piping connection drawing.

1.04 QUALITY ASSURANCE

A. The system shall be completely factory-tested prior to shipment. Testing shall include, but not be limited to: complete pressure and leak testing to ensure system integrity, “Hi-Pot” test, and controls calibration and settings. Each system shall ship with a completed test report to verify completion of factory testing procedure. The system shall be ETL/CETL, NTRL listed, MCA, and electrical system shall be UL Listed to UL 1995 and CSA 22.2 No. 236.

1.05 WARRANTY

A. System parts shall be warranted for a period of 12months from date of shipment from factory.

PART 2 — PART 2 PRODUCT

2.01 STANDARD COMPONENTS

A. CABINET CONSTRUCTION

1. Double Skin Panels:Exterior panels shall be double-wall 24 gauge metal with 24 gauge interior wall and insulated with 1.5 lb (0.68kg) density fiber insulation. Insulation shall be completely protected from the air stream by the panel wall or air blocks. Front exterior panel crown shall be 16 gauge. Front panels shall be powder coated and removable hinged with a locking handle. Exterior frame and panel color shall have color values: L = 14.02, a = 0.13, b = +3.68. Main bezel color shall have color values: L = 13.44, a =.43, b = -2.63.
2. Frame: The frame shall be constructed of 12 gauge bolt-together formed steel for maximum strength. All units shall have full service access from the front allowing systems to be placed side by side.

B. DIRECT DRIVE MOTOR/BLOWER ASSEMBLY

1. Blower: The unit shall be configured for draw-through air pattern, to provide uniform air flow over the entire face of the coil. Each cabinet shall include, double-inlet, double-width centrifugal blower(s) assemblies with forward-curving blades, dynamically and statically balanced as a completed assembly to a maximum vibration level of two mils on all planes. Blowers shall be mounted based on mass and frequency to minimize vibration and noise.
2. Frequency Controlled Motor: A direct drive motor and frequency controller shall be used with each blower in the system to enhance user functionality. The frequency controller shall communicate with the master controller via RS485 MODBUS communication link. Each unit shall be equipped with two blowers with a direct drive motor and a frequency controller for each motor.

C. TANDEM SCROLL COMPRESSORS

1. Refrigeration system: The system shall operate under the coordination of the main controller. Suction and discharge pressures shall be monitored and electronically controllable. Each refrigeration system shall consist of a fully protected scroll or tandem scroll compressor, evaporator coil mounted over an anti-fungal, 94VO thermal formed plastic condensate pan, adjustable expansion valve, filter-drier, liquid line solenoid valve, sight glass, receiver, liquid line isolation valve, low pressure switch and manual reset high pressure switch.
2. Tandem Scroll Compressors: The unit shall contain scroll compressors for optimized performance, efficiency and reliability. The heavy-duty scroll compressors shall be designed for year-round usage. Units shall utilize tandem scroll compressors for staged capacity control.

D. MASTER CONTROLLER

1. Monitoring and Configuration: The master display shall allow monitoring and configuration of the precision air conditioning unit through a menu-based control. Functions include status reporting, setup, and temp/humidity set points. Four LED report the operational status of the connected Precision air conditioning unit.
2. Controls: The microprocessor shall come equipped with control keys allowing the user to navigate between menus, to select menu items, and to input alphanumeric information.
3. Alarms: The microprocessor controller shall activate a visible and audible alarm in the occurrence of any of the following events:
   a. High control temperature
   b. Low control temperature
   c. High control humidity
   d. Low control humidity
   e. High filter differential pressure
   f. Return sensor failure
   g. High supply temperature
   h. Low supply temperature
   i. Loss or low airflow
   j. Supply sensor failure
   k. Water regulator actuator failure (model specific)
   l. PC/Multicool Actuator failure (model specific)
   m. High head pressure
   n. Low suction pressure
   o. Humidifier failure (model specific)
   p. Replace canister (model specific)
   q. Frequency Controller1 failure
   r. Frequency Controller2 failure (model specific)
   s. Air block interlock open
   t. Water detected (optional)
   u. Fire (thermal sensor trip--optional)
   v. Smoke detected (model specific)
   w. Condensate pump failure
4. Logging: The microprocessor controller shall log and display the 30 most recent alarms. Each alarm log shall contain time/date stamp as well as operating conditions at the time of occurrence. Controller shall display the run time hours for major components (compressors, heaters, humidifier, blower motors).

E. ELECTRICAL PANEL

1. The control voltage shall be 24 VAC, class 2 circuit. The electrical panel shall contain contactors, starters, overload protection devices, and input power disconnects. The panel shall be located in the front of the unit for available access.

F. EVAPORATOR COIL/94VO THERMAL CONDENSATE PAN

1. The evaporator coil shall use aluminum fins and rifle-bored copper tubes. Coil end-supports shall be galvanized steel. To enhance dehumidification, the modular system shall utilize dual distributors on one circuit of the refrigeration system. Condensate pan shall be 94V0 Thermal formed, anti-fungal, non-ferrous material for higher indoor air quality.
2. The condensate pan shall have a UL required overflow protection pipe. The overflow piping shall extend from the condensate pan to the base pan of the unit and allow for optional field piping as a gravity drain.

G. PROGRAMMABLE INPUT/OUTPUT INTERFACE MODULE

1. The unit shall provide field connection through a system programmable input/output module. Each interface module shall be programmable with outputs that can map from any system alarm through the microprocessor controller. Inputs shall be capable of mapping to outputs as a system alarm or custom alarm.

H. REFRIGERATION SYSTEM MONITORING

1. The system shall report real time monitoring of both suction and discharge pressures to the controller. Pressures shall be logged and displayed at the proper menu selection on the controls.

I. MAIN POWER CIRCUIT BREAKERS

1. A factory installed, non-automatic main power circuit breaker shall disconnect all high voltage power to the unit if necessary. The disconnect switch shall be accessible without removing the electric box cover.

J. REDUNDANT GROUP CONTROL

1. Shall allow up to 4 groups of 3 FM units to communicate with each other for redundancy, demand fighting prevention, mode assist, and global sharing of certain settings. RGC requires a ship-loose network cable interconnection.

K. NETWORK MANAGEMENT CARD

1. The network management card shall permit multi-level access to monitoring, control, and even notification features over the user’s network.

L. EVAPORATOR FREEZE PROTECTION

1. Suction pressure shall be actively monitored and controlled to eliminate the risk of condensate freeze-up on the evaporator.

M. PREDICTIVE FAILURE WARNINGS

1. Several components within the unit shall provide a warning via the microprocessor interface that service is needed prior to failure occurring.

N. HIGH RETURN AIR TEMPERATURE CAPABILITY

1. All NetworkAIR FM units shall be equipped to handle the high return air temperatures associated with today's high density applications.

O. REFRIGERANT CHARGE ISOLATION

1. For compressor protection, the NetworkAIR FM shall utilize charge isolation and crank case heaters during compressor off-cycles. This shall eliminate the threat of liquid refrigerant migration that could lead to compressor slugging and lubrication issues.

P. STEAM GENERATING HUMIDIFIER

1. Humidifier shall be able to modulate capacity. The humidifier shall be self-contained, steam-generating type, factory piped and wired, with disposable cylinder and automatic solid-state control circuit. The humidifier shall require little or no scheduled maintenance. Humidifier canisters shall be replaceable. The humidifier controller shall communicate directly to the microprocessor controller and provide complete status and control at the operator interface.

Q. SCR ELECTRIC REHEAT

1. Reheat elements shall be low watt density, wired for three-phase, loaded equally on all three phases and shall be electrically and thermally protected by both automatic and manual reset thermal cutouts. Reheat capacity shall be _____ MBH, _____ kW, SCR controlled. Reheat coils shall be stainless steel, fin tubular construction.

R. 30% FILTERS

1. The air filters shall be 30% efficient per ASHRAE Standard 52.1-92, UL Class 2. The full 4" (102 mm) deep, pleated filters shall be replaceable from the front of the unit.

S. HIGH LIFT, DUAL FLOAT CONDENSATE PUMP

1. Factory installed and wired condensate pump shall pump 60gal/h (0.06 L/s) at 60ft (18.3 m) head.

2.02 OPTIONAL COMPONENTS

A. BRAZED PLATE CONDENSER

1. Water and glycol cooled systems shall employ a brazed plate heat exchanger. The condenser shall be equipped with clean-out plugs. Standard pressure rating shall be 450 psig (3102 kPa).

B. WATER REGULATING VALVES

1. Water and glycol cooled systems shall utilize two-way or three-way valves to regulate the amount of water or glycol supplied to the condenser in response to refrigerant discharge pressure. The standard valve pressure rating shall be 400 psig (2758 kPa).

C. FLOORSTAND

1. The heavy gauge floorstand shall raise the unit above the subfloor to match the height of the raised floor. Floorstands shall ship loose and be equipped with air deflectors and for optimal air distribution. Heights available from 12" (305mm) to 24" (610mm) on the FM35 and from 18" (457mm) to 24" (610mm) on the FM50 in 3" (76mm) increments and shall be adjustable +/- 1.5". Threaded pedestals shall provide adjustment. Vibration absorbing pads shall be included.

D. SUB-BASE

1. A sub-base shall raise the height of upflow units for electrical wiring and piping access. The height shall be 10” (254mm). Access panels shall be provided in the front and rear of the sub-base with 1/4 turn latches for removal.

E. PLENUMS

1. A discharge plenum shall mount on top of an upflow unit to direct and distribute conditioned air. The plenum shall be manually adjustable with double deflecting grilles provided on 2, 3 or 4 sides.
2. On downflow configurations, a plenum shall raise the FM35 by 12” (356mm) and the FM50 by 18” (457mm) and discharge air horizontally from the front of the plenum.

F. DISCHARGE DUCT COLLAR

1. A 1” (25 mm) duct flange shall be provided for field installation on a unit to provide convenient connection to external ductwork.

G. CABLE WATER DETECTOR

1. A leak detection sensing cable shall be shipped loose with the unit. If water or other conductive liquids contact the cable anywhere along its length, the main controller visually and audibly annunciates the leak.
2. The detector shall be provided with 20ft (6 m) of cable. Cable may be cascaded up to 500ft (152.4 m).

H. ADDITIONAL PROGRAMMABLE INPUT/OUTPUT INTERFACE MODULES

1. Each system shall be equipped with up to 3 additional discrete input/output modules for a total of 16 inputs/outputs. Each interface module shall be programmable with outputs that can map from any system alarm through the microprocessor controller. Inputs shall be capable of mapping to outputs as a system alarm or custom alarm.

I. FIRESTAT

1. A firestat shall be factory-installed in the return air to sense heat and send a signal to the main controller shutting down the unit and activating a visual and audible alarm.

J. SMOKE DETECTOR

1. A smoke detector shall be factory-installed in the return air to sense concentrations of smoke and send a signal to the main controller shutting down the unit and activating a visual and audible alarm.

K. SPOT WATER DETECTOR(S)

1. A water detector shall be factory-wired and shipped in the bottom of the unit to sense water and send a signal to the master control giving the operator possible alarm indications options for shutdown. The water detector shall be provided with 15 ft (5 m) of wire.

L. FLOW SWITCH

1. Single pole, double throw shall moderate fluid flow when it exceeds or drops below the set flow rate. Flowswitch shall ship loose for field installation.

M. NETWORK CABLE - REDUNDANT GROUP CONTROL

1. Network cables shall be available in 25’, 50’, 100’, or 200’ lengths to ship with your cooling system. The network cable shall be used to interconnect multiple cooling units in a redundant group, as well as to connect the network management card to your LAN.

N. ENVIRONMENTAL MONITORING AND MANAGEMENT

1. Environmental Monitoring Unit: A stand-alone unit shall perform continuous temperature and humidity sensing through two available proves and contact monitoring. Unit shall be controlled by available web, control console, or SNMP interface with network connection. In the event of an environmental anomaly, notification shall be sent to the customer via e-mail or SNMP. The unit shall be 18.25”x9”x2.75”(464mm x 229mm x 70mm).
2. Environmental Management System: A browser-accessible, 1U, rackmountable appliance shall allow monitoring of environmental conditions. Monitoring of one temperature, one humidity, and one vibration sensor shall ship standard. When conditions change, notifications shall be sent via email to the appropriate personnel. The EMS shall provide eight input contacts, 2 output relays, and controllable power outlets for defining actions remotely should conditions warrant it.

PART 3 — PART 3 INDIVIDUAL SYSTEMS

3.01 AIR-COOLED

A. The indoor unit shall consist of an evaporator section including evaporator coil, blower package, controls, electrical section, and compressor.

B. CONDENSER

1. Outdoor Propeller Fan Condenser: The outdoor condenser casing shall be made of aluminum, and all structural supports, coil frame, motor drive supports, and mounting legs shall be made of galvanized steel. The condenser shall have copper tubes expanded into aluminum fins. Headers and connections shall be copper. The coil shall be pressure tested and sealed for shipment. The condenser motors shall have internal overload protection, and operate on _____ V, _____ ph, 60 Hz power. Motors shall be mounted inside the condenser casing for weather protection, and shall be wired to a terminal strip in a weatherproof panel on the unit. The direct drive, aluminum fan blade and painted steel hub assembly, shall be protected by a heavy-gauge, vinyl-coated, steel-wire fan guard. On multiple units, each fan section shall be separated by full-width baffles to prevent bypass air. The condenser shall be sized for _____ º F (ºC) ambient, and condensing temperature controls shall be fan speed for -20º F (-29º C) winter ambient. A ship loose pressure relief valve shall ship with the condenser.
2. Flooded Controls: Flooded controls shall maintain head pressure to -30º F (-34.4ºC) by regulating the effective condensing area within the condenser coil. Controls shall ship loose and be mounted to the side of the condenser. A ship loose pressure relief valve shall ship with the condenser.

3.02 WATER-COOLED

A. The water-cooled system shall consist of an evaporator section including evaporator coil, blower package, controls, electrical section, compressor, and water-cooled condenser. The condenser shall be stainless steel brazed plate design and shall be controlled by 2-way (3-way optional) head pressure-regulated valve. Maximum water pressure shall be 450 psig (3102 kPa).

3.03 GLYCOL-COOLED

A. The glycol-cooled system shall consist of an evaporator section including evaporator coil, blower package, controls, electrical section, compressor, and glycol-cooled condenser. The condenser shall be stainless steel brazed plate design and shall be controlled by 2-way (3-way optional) head pressure-regulated valve. Maximum water pressure shall be 400 psig (2758 kPa).

B. FLUID COOLER

1. Outdoor Fluid Cooler: The fluid cooler casing shall be of aluminum, and all structural supports, coil frame, motor-drive supports, and mounting legs shall be made of galvanized steel. The fluid cooler coil shall have copper tubes expanded into aluminum fins. Headers and connections shall be copper. The coil shall be pressure-tested and sealed for shipment. The fluid cooler motors shall have permanently lubricated, sealed, ball bearings, and internal overload protection. Motors shall be mounted inside the fluid cooler casing for weather protection and wired to a terminal strip in a weatherproof panel on the unit. The direct-drive, aluminum fin blade and painted steel hub assembly shall be protected by a heavy-gauge, vinyl-coated, steel-wire fan guard. On multiple fan units, each fan section shall be separated by full-width baffles to prevent bypass air. The fluid cooler shall be sized for 95º F (35º C) ambient, and operate on _____ V, _____ ph, 60 Hz power.

C. PUMP PACKAGE

1. Single Pump Package: The pump package shall be comprised of a centrifugal pump in a vented enclosure with pump starter, separate fluid cooler fan and pump circuit breakers, Aquastat, and fan cycling contractors to control the fluid temperature. The controls shall be mounted on the fluid cooler. An expansion tank and Airtrol fitting shall be supplied for field installation. The pump size shall be sized for _____ GPM (L/s) at _____ ft (m) external head, and operate on _____ V, _____ ph, 60 Hz power.
2. Dual Pump Package: The dual pump package shall consist of two centrifugal pumps in an enclosure. Pump starters, automatic pump switch-over controls, lead-lag pump selector switch, separate fluid cooler fan and pump circuit breakers, Aquastat, and fan cycling contractor to control the fluid temperature shall be mounted on the fluid cooler. An expansion tank and Airtrol fitting shall be supplied for field installation. Each pump shall be sized for _____ GPM (L/s) at _____ ft (m) external head, and operate on _____ V, _____ ph, 60 Hz power.

3.04 ECONOMIZER

A. Glycol systems shall have the option of an economizer coil that is designed to reduce operating costs during mid to low ambient temperatures. Economizer cooling coil shall be copper tube, aluminum fin coil located in the return air before the V-Frame evaporator coil. The economizer coil shall be rated at ____BTU/HR (kW) sensible cooling capacity with a 45 F (7.2 C) entering glycol solution temperature. The economizer coil shall require ____ GPM (l/s) and the total unit pressure drop shall not exceed ____feet of water (kPa), when in the economizer mode of operation.

3.05 MULTICOOL

A. Air, Water and Glycol systems shall have the option of a chilled water coil that is designed to be the primary cooling source to the backup direct expansion coil. The MultiCool (chilled water) coil shall be constructed with copper tubes and aluminum fins. It shall be located in the return air, before the V-Frame evaporator coil. The MultiCool coil shall be rated at ____BTU/HR (kW) sensible cooling capacity with 45 F (7.2 C) entering water temperature. The MultiCool coil shall require ____GPM(l/s) of chilled water and the pressure drop shall not exceed ____psig (kPa).

Guidelines for Installation

The NetworkAIR FM provides reliable, accurate temperature and humidity control of computer rooms, laboratories, and other environments that require close tolerance control. The unit incorporates the latest system design innovations to provide you with optimum efficiency, reliability, and accuracy of control.

The NetworkAIR FM system will provide years of trouble-free service, when installed and maintained by technically qualified personnel.

Room preparation

During the design of the room, consideration should be given to the following factors: ease of entry for the system, floor-loading factors, and accessibility of piping and wiring.

The room must be sealed with a vapor barrier to minimize migration of moisture. Polyethylene film (plastic sheeting) is a good vapor barrier for ceiling and wall applications. Rubber- or plastic-based paints should be applied to concrete floors and walls. The room should be thoroughly insulated to minimize thermal loads and make-up air (if required) should be preconditioned to reduce additional temperature, filtration, and moisture loads.

A room using a raised-floor plenum for air distribution should have at least 9" (300 mm) of clear space between the false floor and sub-floor for a finished floor height of 12" (380 mm). Pay special attention to the location of pipe chases, electrical conduits and other obstructions under the floor. These objects can block air circulation and cause loss of air pressure, thus reducing system efficiency and causing hot spots in your room.

APC should be notified before installation if the unit is incorrect for the application.

Unit location

The location of the unit is important for efficient and balanced environmental control in your room. The air conditioner should be located as close as possible to the largest heat load. In rooms having a high aspect ratio, mount the unit along the longest wall to ensure even air distribution. If improperly installed, erratic control or mechanical failure can and will result.

Service access

At least 36" (915 mm) of clear space must be left in front of the unit for routine service (filters, humidifier).

Receiving the unit

Your NetworkAIR FM unit has been completely tested and inspected prior to shipment. To ensure that you have received the unit in excellent condition, perform a careful inspection of the crating and the unit immediately upon receipt. Verify that all parts ordered were received as specified and that the unit is the correct size and voltage necessary to fulfill your environmental control needs. Report any damage discovered to the freight carrier. If necessary, contact the APC field service department for help in repairing or replacing damaged parts. While APC is not responsible for damage incurred in transit, we want to make sure that you have no undue delays in your system start-up.

Rigging

The unit is manufactured with a formed steel frame for maximum strength and unit integrity. However, as with all electrical and mechanical equipment, you must take care with proper rigging of your unit.

When using a forklift to move the unit, use the shipping skid to protect the bottom of the unit. When using chains, cables or rope to lift the unit, use spreader bars to prevent damage to the finished panel.

Floorstand

Install a threaded pedestal into each leg of the floorstand. Use the washer and nut on each panel to tighten against the floorstand leg.

Utility connections

All connections are made through the bottom left of the unit (the left side of upflow discharge units) for ease of service connections. Refer to the installation manual for pipe sizes and specific locations for your unit.

Power unit

The NetworkAIR FM unit uses 3-phase power for operation. Power connections are landed to a receptacle on either floorstand or sub base. Bring the service cable through the bottom left of the unit and through the bulkhead hole into the electrical box to the circuit breaker provided on the left side of the electrical box. The ground lug is located near the 3-phase high-voltage connector. **THE UNIT MUST BE UTILITY GROUNDED OR THE WARRANTY IS VOID.**

Humidifier connections

The humidifier inlet connection point is provided with the equipment. A 1/4" (6.4mm) compression connection is supplied with the unit.

Condensate drain

Condensate from the evaporator pan is collected and discharged by the condensate pump to a 5/8"od (15.9mm) fitting for field connection.

Water supply to humidifier

1. The humidifier fill valve orifice is sized for supply water pressure from 15 PSI (103.4 kPa) to 150 PSI (1034 kPa).
2. For cases above 150 PSI (1034 kPa), install a pressure-reducing valve in the water feed line to the unit.
3. With extremely dirty or muddy water sources, proper filtration is required on the unit's incoming water line.
4. DO NOT use softened water with the humidifier. Softened water is too conductive.
5. DO NOT use completely demineralized water with the humidifier. The minerals allow the electrode principle to work.
6. DO NOT use a hot water source. Doing so will cause deposits that will eventually block the fill valve orifices.
7. Water supplies with high conductivity (above 800 mW) must be preconditioned for proper operation and longevity of the humidifier.
8. Water supplies with low conductivity (less than 125 mW) may require a low conductivity cylinder (contact the APC configuration team). When the cylinder is first installed, a teaspoon of salt or an Alka-Seltzer tablet may be required to start humidification. If conductivity is less than 75 mW, water treatment may be necessary.

Water supply

A 16- to 20-mesh strainer must be installed in the water supply to the water units to prevent clogging of brazed plate condenser. This is a field item.Also recommended on glycol units.

Note: Because of an ongoing program dedicated to product improvement, specifications are subject to revisions without notice. APC assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

APC Worldwide Customer Support

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to find answers to frequently asked questions (FAQs), to access documents in the APC Knowledge Base, and to submit customer support requests.
  - **www.apc.com** (Corporate Headquarters)

    Connect to localized APC Web sites for specific countries, each of which provides customer support information.
  - **www.apc.com/support/**

    Global support with FAQs, knowledge base, and e-support.
- Contact an APC Customer Support center by telephone or e-mail.
  - Regional centers:

APC headquarters U.S., Canada	(1)(800)800-4272 (toll free)
Latin America	(1)(401)789-5735 (USA)
Europe, Middle East, Africa	(353)(91)702020 (Ireland)
Asia Pacific	(61) 2 9955 9366 (Australia)

  - Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

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